modern machine shop

THE 80% LEARNING CURVE See Page 108 MACHINING JUKE BOX PARTS See Page 112

MARCH 1960



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Conten The Idea-Full Magazine

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Member

BPA

A Statement of Policy

The principal function of MODERN MACHINE SHOP is to search out and disseminate the best and newest ideas for the advancement of engineering skill and mechanical efficiency in the metalworking industry, and neither effort nor expense is, or shall be, spared in the performance of this task.

FEATURES

MARCH 1960

THE 80 % LEARNING CURVE

By C. W. S. Parsons

The theory and application of this technique of establishing time standards, costs and other productivity factors are discussed.

Page 108

MACHINING JUKE BOX PARTS

By Ira S. Roberts

At the Grand Rapids, Michigan, factory of Automatic Music, Inc., specially selected lubricants assure fine finish and extremely close tolerances in performing a wide range of operations on a variety of metals.



Page 112

HOW TO DESIGN JIGS AND FIXTURES

By Harold Sedlik

Author gives a number of helpful suggestions for maintaining limited-production jig and fixture expense at the very minimum.

Page 116

PRODUCING GREASE RETAINING RINGS

By Bartlett West

Stainless steel rings are machined inside and outside to close tolerances in a single 20-second cycle.

Page 120

HOW TO SOLVE SUPERVISORY PROBLEMS

By Alfred M. Cooper

Industrial management must furnish the inspired leadership for the country during the critical decade of the 1960s.

Page 122

in this issue

VOL. 32 . NO. 10

REPAIRING A BROKEN CRANKSHAFT

By G. M. Hopkins

This picture story shows, in a step-by-step manner, how the Machine Shop at the Jayhawk Works, near Pittsburg, Kansas, recently performed an unusual repair job on a huge crankshaft for an ammonia compressor.



Page 124

MACHINING STAINLESS STEEL

By G. J. Stevens

Modified drill grind solves oversize hole problem in machining 5%-inch bushings from Type 440 F stainless steel rounds.

Page 126

TAILPIPES BY THE HUNDREDS

A numerical control system automates a new pipe bending machine on which some 750 separate and distinct types of tailpipes for automobiles and trucks can be produced automatically.

Page 128

MACHINE TOOL LEASING PLAN

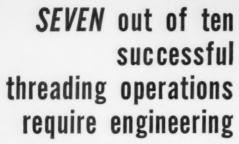
Jones and Lamson Machine Company announces the Profitivity Lease Plan®, a one-package plan for leasing standard and special tooling and perishable tools.

Page 136

MORE PRODUCTION THROUGH MODERNIZATION

Section includes a number of case histories illustrating and describing techniques for increasing output on a variety of metalworking operations with newly developed machines and tools.

Page 144



Recent Landis sales figures show that 7 out of 10 successful Threading Operations require some Engineering to assure the utmost in Threading efficiency. "Threading Equipment by Landis" includes Engineering Service geared to offer help with any Threading Operation. This Enginering Service is the best available. Backed by the resources of the World's Largest Manufacturer of Threading Equipment, our Engineering Department is able to handle every type of Technological requirement.

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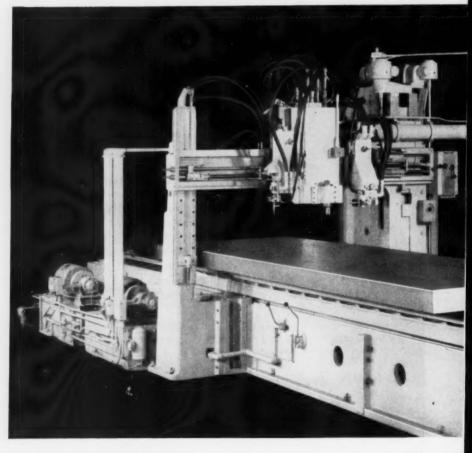
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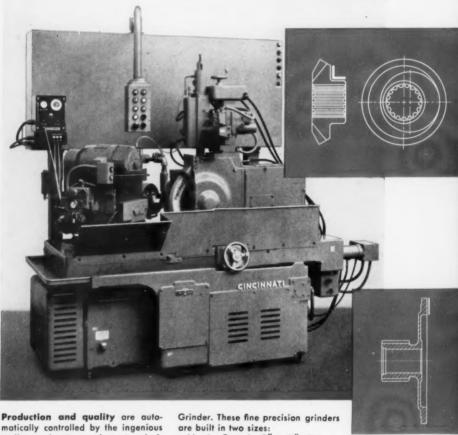
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 per H.P. expended:
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No. 1—Capacity 0" to 4" diam.
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Operation , Finish grind diameter, adjacent face, radius

Material ... 8625H steel Production . 72 per hour



Two-spindle headstock, pneumatic diaphragm chucks, automatic truing, manual loading.

Part Name . Transmission gear

Operation . Grind face Material . . Steel Production . 94 per hour Application of the chucking method of grinding is not always well defined. But Cincinnati Grinding Specialists know exactly when it should be used . . . they have the opportunity to weigh it against the centertype and centerless methods. In shops throughout the country, manufacturing lots of several hundreds or thousands can be ground at the lowest cost on CINCINNATI FILMATIC Chucking Grinders.

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9" column 3'-4' arms



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13"-15"-17" column 4'-5'-6'-7' arms



19" column 6'-7'-8' arms



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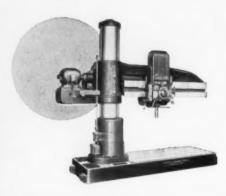


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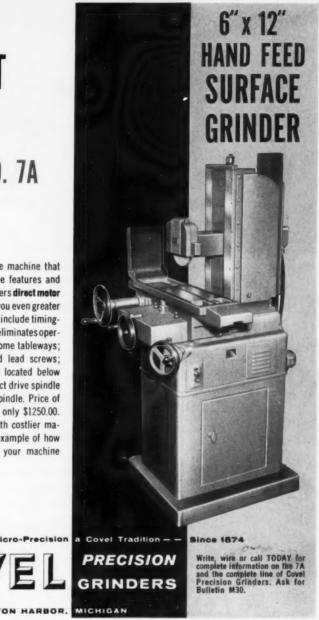
The Carlton Machine Tool Co., Cincinnati 25, Ohio.



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NEW DIRECT DRIVE COVEL NO. 7A

Low-Cost No. 7A-the machine that gives you big machine features and performance—now offers direct motor driven spindle to give you even greater value. No.7A features include timingbelt table drive which eliminates operator fatigue: hard chrome tableways: hardened and ground lead screws: elevating hand wheel located below table level; 34 HP direct drive spindle or 1/2 HP belt drive spindle. Price of belt drive machine is only \$1250.00. Compare Covel 7A with costlier machines-it's another example of how Covel quality makes your machine dollars go further.





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Four Landis Abrasive Surface Grinders in operation at the Progressive Tool Company, York, Pennsylvania

LANDIS Abrasive Surface Grinders demonstrate dependable precision in tool and die plant



At Progressive Tool Company, grinding is their largest operation. In this modern plant, four Landis Abrasive surface grinders are used for a wide variety of precision operations on tools, dies, gauges and special machine parts. Progressive reports complete satisfaction with the ease of operation and accuracy of these machines.

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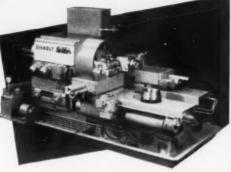
GISHOLT NO. 24 HYDRAULIC AUTOMATIC LATHE

When it comes to fast production of top quality spherical roller bearing races, SKF doesn't fool.

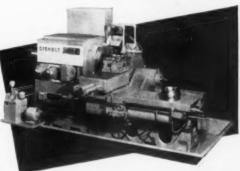
These big Gisholt No. 24 Hydraulics remove 34 lbs. of metal in two operations in a total of only 2.80 minutes' machining time on each of two machines. All cutting is on 52100 bearing steel and done at speeds of 325 to 350 f.p.m.

Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24' diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.



First Operation: Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.



Second Operation: Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."

GISHOLT MACHINE COMPANY

Madison 10. Wisconsin



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Wesson Presents a New Era of with the all-new WESSON T-A*

Now after two years' research and 25 tested prototypes, Wesson brings to industry the all-new Wesson T-A*. Completely new in design, performance and value, the Wesson T-A* simplifies your tooling for throw-aways, saves time, effort and money. It has just two units plus the tip, yet

gives full adjustability, within its range, for *any* insert or chipbreaker setting. Tool changes and adjustments are made quickly, easily, regardless of holder position or orientation. Write today for detailed information on the all-new Wesson T-A*.

The new **WESSON T-A*** handles more parts with less tooling. Here's why...



2 in 1 Anvil-Locator with Flat Anvil Seat_

Precision, one-piece investment steel casting for maximum strength and rigidity. Coined seat assures flatness. Zero side overhang permits compact ganging of tools. Designed for $\frac{3}{6}$ " thick inserts but can also use $\frac{1}{8}$ " with locked-in shim. Fine detail in holders makes possible use of inserts with radii as small as $\frac{1}{64}$ ". Protects shank, easily replaceable when damaged. New shank purchase unnecessary.



Wide Range, Vise-Jaw Type Clamp Unit -

Fast, parallel clamping at all times. No breakage of inserts or chipbreakers when indexing or changing inserts. Complete clamp assembly rides up and down on compound screw. Large clamping range. Set low, set back and relieved so chip will not hit clamp. Can be used without chipbreaker on cast iron, etc. Design prevents incorrect reinsertion if assembly is removed from shank.



16

Adjustable, Solid Carbide Chipbreaker -

Adjustable over wide range, with vertical and visible serrations. Regrindable six times. Supported and springlocked in channel of clamp yet easily adjusted or removed with fingers. Rides up and down with clamp when indexing, cannot drop out.

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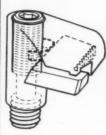
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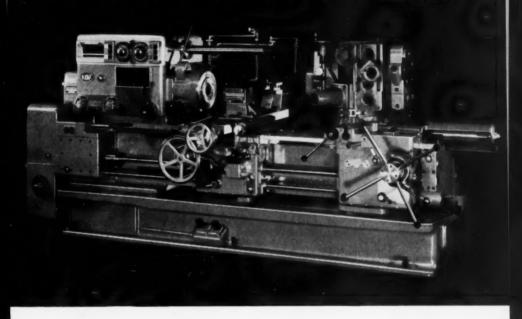
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MODERN MACHINE SHOP

March, 1960

VDF for quality, craftsmanship and economy





TURRET LATHES

have Electric Automatic Cycle Control

The value of the turret lathe is its ability to use several tools simultaneously and in sequence. But the machine operates at top efficiency only when its operator selects the correct speeds and feeds – and selects them quickly!

All RS Model VDF turret lathes have an electric automatic cycle control that allows the set-up man to pre-set the spindle speeds, direction of rotation and feeds at all turret positions for any given workpiece. The control changes are governed by the position of the turret, requiring the operator only to index the turret. This exclusive "pegboard" control makes all operations fool-proof and rapid,

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In addition, the automatic cycle control incorporates an electric preselector that lets you "hand

select" individual spindle speeds and feed rates, and interrupt the cycle at any time.

There are many more reasons why you should consider VDF turret lathes. Write for Bulletin 131 e.



VDF Lathe Division of Rudel Machinery Co., Inc. 165 MILL LANE, MOUNTAINSIDE, N. J.

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For Fast Removal Of Tough Metals Specify ELECTROLYTIC GRINDING

For Electrolytic Grinding Specify POPE PRECISION "ANOCUT" SPINDLES

with total eccentricity of shaft less than fifty millionths (.000050")

Pope "Anocut" Spindles are available for 50 to 3000 amp, operation, motorized or belt driven with wheels up to 28" dia. They are equipped with built-in insulation and a new Pope rugged fork type, cool operating brush assembly for transmitting low voltage, high amperage current to the wheel.

To get the most production out of electrolytic grinding, you need Pope designed, precision built electrolytic grinding spindles. Let us have your specifications for quotations.



Pope Precision P-19162 ANOCUT Spindle; 1 to 20 HP, 1800 RPM.



ANOCUT Spindle mounted or Pope heavy duty universal slide with indicators for measuring feed in ten-thousandths



Page Precision P-3007 ANOCUT Spindle 10,000 RPM.



Pope Precision P-6651-XG-S4 ANOCUT Tilting Head for attaching to Cincinnati #2 Tool and Cutter Grinder.



for 2000, 3000 and 5000 RPM.

No. 127



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March, 1960

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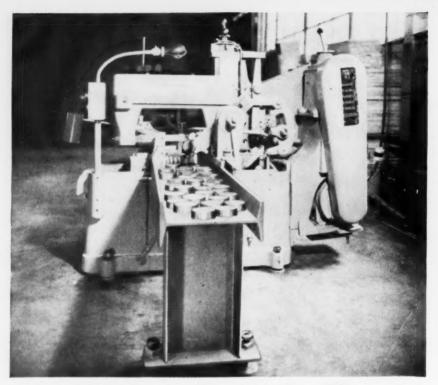
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Payoff End of a Production Marvel

A cut-off saw's value is proven at the discharge end of the machine. How quickly the trough is filled with accurately cut-off pieces can mean the difference between profit and loss on many jobs.

The R. J. Sudrick Co., Des Plaines, Illinois, manufacturers of precision aircraft components had to cut-off 4600 blanks from 3¼" round, 303 Stainless Steel Bars.

They bought our MARVEL No. 6A4 High Speed Heavy Duty Automatic Bar Feed Hack Saw Machine; used MARVEL High-Speed-Edge Hack Saw Blades, and got the high production, accuracy and economy they desired.

The point is this: MARVEL Metal Cutting Hack Saws equipped with MARVEL High-Speed-Edge Hack Saw Blades are an unbeatable combination for economical, accurate and safe cutting-off.

If your hack saws are not producing the economy you need to meet today's competition, try MARVEL High-Speed-Edge Blades. They will give you the competitive edge every time. Write for Catalog C-85 which has the complete story on MARVEL Hack Saws and Band Saws, Hack Saw Blades and Band Saw Blades.



ARMSTRONG-BLUM MFG. CO. 5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

MARVELSAWS

PRODUCTION?

Constant at 20 pieces per hour floor to

ACCURACY?

Held well within the permissible tolerance of +.010 -.000

BLADE COST?

Just 1½¢ per cut. Only twenty-three MARVEL blades were needed to make the 4600 cuts, and not a single blade failure due to blade breakage. MARVEL High-Speed-Edge Blades are unbreakable.

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4 Additional Burgmaster Turret Drills Purchased at as a result of 1st Machine's Performance







Potentiometer Dial and Knob pressfit assembled using air-operated holding fixture mounted on Burgmaster Table.

Sequence of Operations: Place Dial and Knob in fixture; close fixture; drill, tap and fasten socket set screw. Tapping heads used to hold taps and hex wrenches — double tooling.

This Burgmaster Bench Model "O" 6-spindle Turret Drill was recently purchased at the Helipot Division of Beckman Instruments, Inc. It is the fifth machine to be installed within a period of a year and is a further step toward producing better machined holes faster and cheaper at this modern plant.

In the operation shown, the Burgmaster Bench Model Machine is used to assemble, drill, tap and fasten two parts of a Potentiometer Dial. Formerly, with a hand indexed turnet drill, there was a problem of operator fatigue and rejects were high.

Greater precision and enthusiastic operator acceptance has resulted from this Burgmaster installation — due to the speed and ease of operation. The Burgmaster turret power indexes at operator command, performing up to six operations at one location. Preselective spindle speeds, precision depth stops and a sensitive feed handle assure the most efficient working rate while increasing tool life.

95% of Burgmaster Users Report up to 230% Savings Write for the complete facts. Free literature illustrates and describes machine features including specifications and accessories. See us. at: — National ASTE Show Booth No. 734, Detroit, Michigan



Burgmaster Model 1C Six-Spindle Turret Drill — 12 speeds from 325 to 4050 — 1/2" drill and tap capacity in cast iron — 1 H.P.



World's largest manufacturer of

torret-type drilling and tapping machines.

BURGMASTER CORPORATION

SMALL TOOL DIVISION - BURG TOOL MANUFACTURING CO., INC.

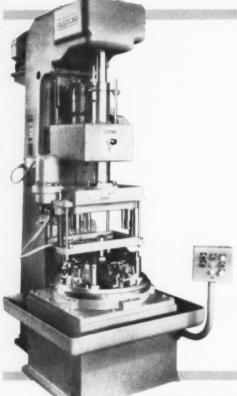
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CLEEREMAN CREATES

Special Automatic Drilling and Tapping Machines adapted to your individual work problems at a moderate price



An example of one such adaptation is presented by the accompanying photograph which shows a standard Cleereman "Series A" Automatic Drilling and Tapping Machine equipped with Multiple Spindle Head and Rotary Index Table to produce thousands of finished parts week after week with an exceedingly low capital investment.

A fixed center, combination drilling and tapping head is attached to the flanged spindle quill of the standard machine. The multiple spindle head has six spindles arranged in three groups of two each. High speed, non-reversing spindles for drilling and chamfering are driven by an auxiliary motor mounted on the head; slower speed, reversing tapping spindles are driven by the machine spindle. Correct speed and geared tap lead are obtained by pick-off gears in the top head of the machine.

Rotation of the index table is timed with the spindle cycle to provide fully automatic operation. The machine operator loads the workpieces and depresses the "Cycle Start" pushbutton; the rotary table indexes; the spindles power rapid traverse to the work; drills, taps and chamfering tools feed; tapping spindles reverse at depth and lead out; spindles power rapid traverse up—and the job is completed—quickly—automatically—without fatigue or error.

What is your problem?

A specialized "standard" Cleereman Series A Automatic may be your answer for greatly lowered production costs and increased production with a nominal investment.

See your local Cleereman distributor, or wire, write, or phone direct.

CLEEREMAN MACHINE TOOL CORP.

GREEN BAY, WISCONSIN

General Distributors: The Jackson-Fotsch Company • 7350 West Lawrence Avenue • Chicago 31, Illinois
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m) BUTTERFIELD

BUTTERFIELD 100% INSPECTED TOOLS

A PRODUCT OF SKILL

the complete line Butterfield drills are produced with skill and delivered with speed, like all other Butterfield tools: taps, reamers, dies, counterbores, cutters, end mills, hobs and carbide tools. Phone for these, or for technical aid. Warehouses in Chicago, Detroit, Fort Worth, Los Angeles, New York and San Francisco. Call your Butterfield Distributor.

BUTTERFIELD

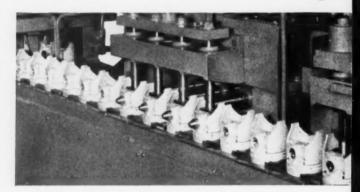
DIVISION, Union Twist Drill Company, Derby Line, Vt.

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4 PIECES in 8 SECONDS to .0002"

7 MICROINCHES





BEARINGIZING—the microsmooth finishing process—can put more life in your bearings at less cost. It work-hardens the surface to reduce porosity, and develops corrosion resistance.

For example, Cogsdill Bearingizers now finish aluminum piston wrist pin holes on the four-spindle automatic machine shown above, to accuracies of .0002" with measured finish of seven microinchesand better. The machine finishes four pieces every eight-second cycle; one set of rollers produces 25,000 holes.

For better finishes—O.D.'s or I.D.'s, get the Bearingizing story in the Cogsdill catalog.

Cogsdill

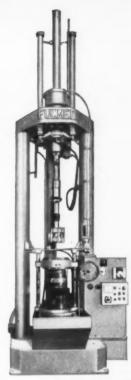
TOOL PRODUCTS, INC.

12976 W. EIGHT MILE RD., OAK PARK 32, MICHIGAN
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March, 1960

Why does the best ... cost less?



Honing machines, unlike most machine tools, do not require massive weight and rigidity to maintain accuracy. Fulmer designers recognize this basic concept by "beefing up" their machines only where it counts . . . with heavy-duty oversize spindles, bearings and gear train . . . the vital working parts. Functionally designed Fulmer Honing Machines save you money by eliminating needless masses of high-priced cast iron and steel . . . they weigh less, cost less.

Fulmer machines combine simplicity with flexibility, quality with economy. All this and never a charge for service!

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Dept. 30-C 107 E. Fourth St.

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model "S" 24 useful spindle speeds, 66 feeds & threads heavy duty 16" medium duty 20"



new developments coming!



model 280 16 useful spindle speeds, 60 feeds & threads heavy duty 14", 16" medium duty 20"

The Springfield Machine Tool Company Springfield, Ohio

Engine & **Toolroom** Lathes

Springfield lathes have 10, 15 or 20 horsepower motors for heavy cuts, and have simple, practical features that keep the operator productive and keep the maintenance man away. Pressurized mist lubricates the headstock. Only four gears are in mesh for a given speed-the others run free. Clean, functional design and simplified controls promote pride of workmanship and minimum waste motion.

Ruggedness with precision has always been characteristic of Springfield lathes-because they are built to one standard of excellence. A Springfield engine lathe meets the accuracy standards set up for toolroom lathes -without any cost penalty.

Whenever you want maximum power and efficiency, and the cost designed out by designing simplicity in, consider a Springfield lathe. A full range of attachments is available-hydraulic contouring and reproducing, plain and universal relieving, taper, etc.

If you would like to know more about Springfield lathes, please write for Bulletins 190-G and 201-G.



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AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS

Check These Exclusive Empire Floating Tool Holder Features:

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.







Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

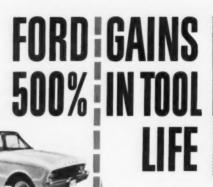
Check These Exclusive Empire Floating Tap Holder Features:

- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension taps float in and out.
- Wide range of float—simple adjustment locknut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.

MPIRE TOOL COMPANY

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BESLY X-PRESS TAPS Speed-form internal threads in metals such as copper, brass, die castings, aluminum, lead, leaded steels and other ductile materials. They are available in standard tap sizes and various styles for through or bottoming holes. Patent No. Re. 24,572. Other patents pending.

when Besly X-Press* Taps
speed-form internal threads
in Falcon windshield
wiper housing!



machine, tap directly into three cored holes in

the Falcon's aluminum die cast windshield wiper housing. Drilling operations were

avoided. Production is continuous. The Besly

X-Press Tap produced as high as 50,000 tapped holes before replacement—thus offering increases of approximately 500% in tool life over conventional cutting-type taps. Speed-forming makes stronger, burnished internal threads, without cutting. There are no chips to load the tap in bottoming holes such as these. And faster cycling speeds production!



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120 Dearborn Ave., South Beloit, Illinois

Grinders and Abrasives * Taps * X-Press Taps* * Drills * Reamers * End Mills * Tool Bits

Gages . Carbide Tipped Tools, Blanks, Inserts and Holders

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For best results in Surface Grinding . . . Always Use Blanchard Wheels!

The flexibility in application of your Blanchard Surface Grinder enables you to attain peak production at lowest cost on hundreds of different grinding jobs. But, it is very important that you use the right wheel for each job!

Blanchard makes and stocks a great variety of silicate, resinoid and vitrified bonded wheels and segments. Ask your Blanchard representative to help you select the wheel - or wheels - best suited to your requirements. Call or write him today. And may we send you a copy of "The Art of Blanchard Surface Grinding" (4th Edition)?

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Can you put your finger on machining economies like this?

Cost of 800 brazed single point tools at approximately \$3.50 each TOTAL \$2,800.00

Cost of 100 square CARMET INDEXABLÉ INSERTS with 800 cutting edges at

APPROX. \$100.00

In addition to these savings on machining, you gain in high production rates, longer tool life, in longer tool storage and inventory, as well as tool change downtime.

Over 9 styles and 109 sizes Carmet cadmium plated tool holders. 6 carbide grades for machining almost all materials from wood and plastics to high alloy steels.

then it's time to switch to **CARMET INDEXABLE** INSERTS AND TOOL HOLDERS





Write for New-Revised CATALOG C-16-8 CARMET CEMENTED CARBIDES FOR INDUSTRY

This 32-page book contains revised price and complete specifications on Carmet's full line of cemented carbide tipped tools, blanks and holders. Speed and feed charts, grade comparisons and ordering infor-

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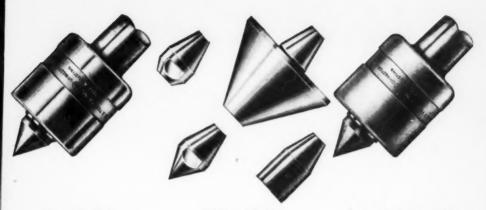
See your Carmet Distributor now-or write to Carmet Division, Allegheny Ludlum, Detroit 20, Michigan.



CEMENTED CARRIDE DIVISION OF ALLEGHENY LUDLUM STEEL CORPORATION



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Famous Perfection
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H.S.S. and Carbide Accurate Detachable Points Expansion Compensating
Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

INCLUDING 5 TYPES OF EXPANSION COMPENSATING CENTERS

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- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- · Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

Write today for a free copy of the J & S Live Center Catalog.

J & S TOOL CO., INC.

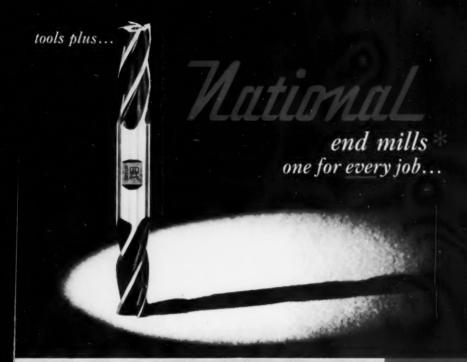
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J & S TOOL CO., INC., ALSO MANUFACTURES FLUIDMOTION WHEEL DRESSERS CLAMPS • NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES

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National offers you a complete line of job-proven end mills; there's one to meet your every possible requirement. And each one carries the built-in extras and added values that make National tools not just tools . . . but tools plus. With National tools you get all these important plus values:

Assured production uniformity • Knowledgeable field engineering

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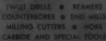
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Denver I have twelve
LeBlond Lathes, six of
them purchased in the
last year. LeBlond
Lathes are the best dollar
investment I can make."

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On receipt of this advertisement, before August 1, 1960, the R. K. LeBlond Machine

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before August 1, 1960, the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio will deliver a valuable and useful article to the sender.

THOMAS A. RAGSDALE

ice President, Ragsdale Bros. Tool & Die, Inc., Englewood, Colo.

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THE R.K. LeBLOND

"Having a new LeBlond is better than having the cash." Call a LeBlond representative or ask a LeBlond owner.

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DEPOSIT AT LEBLOND A LETTER WHICH READS . .

With LeBlond Lathes"

"Tom Ragsdale tells me that his LeBlond Lathes give him a definite advantage over his competition. It's things like this that make me proud I sell LeBlonds."

RE. DuBoc



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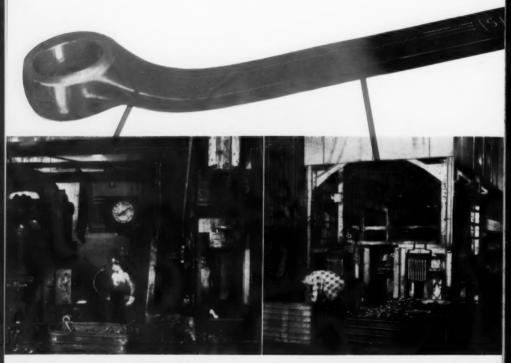
MACHINE TOOL COMPANY



The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio

It's a Push-Button World at Williams

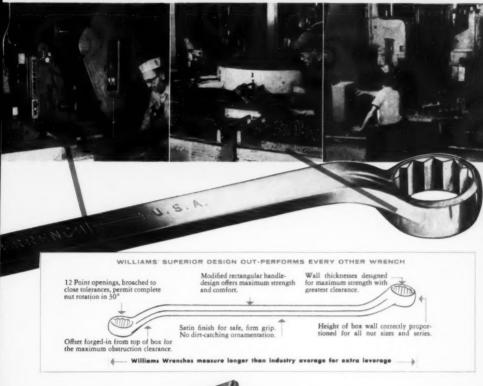
No other manufacturer has the combination of automated equipment to make the finest fit, feel and finish in wrenches!



Forging temperatures for each of Williams' 65 hammers are automatically controlled by sensitive pyrometric instruments which comply with rigid aircraft specifications, MIL-Q-5923C (USAF). The result is tough, fine-grain forgings every time. Die matching is held to close tolerances for maximum structural uniformity.

Special conveyorized heat-treating equipment automatically heats and quenches forgings in a series of salt baths to prevent decarburization and dimensional distortion often found in other wrenches. It further develops the relationship of toughness and hardness to the optimum.

Feel and finish are refined on this automatic profiling machine. All rough edges are completely removed. Wrench handles are profiled to uniform dimensions and are blended into the heads for greatest strength. Here wall thicknesses are machinecontrolled to exact concentricities. This extra step produces heads offering uniform clearances from wrench to wrench...pattern to pattern. Developed specially for Williams, this three station transfer machine drills, broaches and chamfers. Box openings are machined to tolerances well within industry standards for long-lasting, sure-grip fit.





MR. WRENCH says:

SEND FOR THIS NEW JAM-PACKED CATALOG No. 304. Lists 4530 stock tools and forgings...wrenches of all kinds, power sockets, clamps, tool holders, hoist hooks, eye bolts, and many more...

THE BROADEST LINE OF ITS KIND



TOOLS OF INDUSTRY

J. H. WILLIAMS & CO.

DIVESION OF UNITED-GREENFIELD CORPORATION

412 Vulcan Street, Buffalo 7, New York

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OLIVER "ACE" TOOL AND

Traverses the wheel-not the work!

You can grind tools and cutters more accurately with the Oliver "ACE" because the wheel is brought to the work, reversing the usual process. Abrasive dirt and grit cannot cause wear because the cross carriage is not in motion. The horizontal ram which supports the grinding head is fully enclosed—sealed against dust and dirt. Further accuracy is assured because the wheel is trued by a stationary diamond which provides a fixed grinding line. It is not necessary to reset the cutter to compensate for wheel wear.

The "ACE" is a tool and cutter grinder designed expressly for tool grinding—not a general purpose machine adapted to tool room work. It is simple to set up. All angles are obtained by direct reading. Operators stand in a natural position with the control lever in easy reach and the work in direct view.







Face mills, reamers, end mills, staggered tooth cutters, slab mills, spot facers—all cutters straight or spiral—are quickly, easily and economically sharpened with the Oliver "ACE". Both standard and heavy duty models are extensively used for sharpening carbide-tipped circular wood saws used in both woodworking and metalworking.

Write today for complete information. We'd appreciate the opportunity of sending a quotation.

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1430 E. Maumee St. · Adrian, Michigan

DRILL GRINDERS AND THINNERS-TOOL AND CUTTER GRINDERS-AUTOMATIC AND MANUAL FACE MILL GRINDERS-TOOL BIT GRINDERS-CONTOUR SAWING AND FILING MACHINES

HOW TO REDUCE YOUR

Three elements are absolutely necessary if there is to be a substantial reduction in cutting tool costs—the right tool, the right geometry of grind on that tool, and the right machine to produce the grind. There are various machines which will always be most suitable for specific applications. However, for the average cutter grinder jobs, Oliver has pioneered a new approach to the problem with the introduction of the "ACE" tool and cutter grinder.

The cost savings are attractive with respect to both setup time and grinding time. Setup usually consists of two simple "direct-reading" adjustments. The first setting is made to produce the angular or straight line grind requirement. The second setting consists of tilting the grinding wheel spindle to produce the proper clearance—all extremely simple.

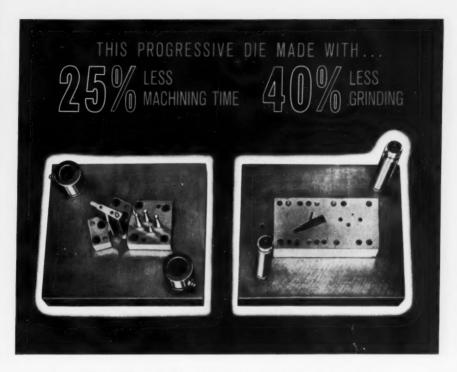


The Heavy Duty "ACE"

Grinding time is reduced considerably because tool travel is eliminated in most cases. Thus the time consists wholly of bringing the grinding wheel on and off the cutting tool. This compares extremely favorably with competitive grinding procedures.

There are two versions of the "ACE": the standard, which is suitable for high speed and light duty carbide grinding, and the heavy duty model which is designed for grinding tungsten carbide cutters and tools in all of their many forms.

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LO-AIR TOOL and DIE STEEL

. . CUTS PRODUCTION COSTS

Accurate Machine and Tool Company of Roselle Park, N.J., reports savings of 40% in grinding and 25% in machining time on this progressive die—through the use of LO-AIR, the tool and die steel that is easy to machine—has least distortion in hardening.

On oil hardening tool steels, previously used for this die, .015" was allowed on sides for grinding and .005" in jig bored holes before heat treating. With LO-AIR they found it

safe to allow not more than .0025" on sides and no extra in holes before hardening—making great savings possible.

For complete information, write today for Performance Report No. 20. Also, we will gladly send you a copy of our 12-page LO-AIR brochure on applications, properties and other technical data. For immediate delivery of LO-AIR, call our nearest sales office or warehouse. Complete stocks available.

*U.S. Pat. No. 2,355,224



TOOL STEELS + STAINLESS STEELS . HIGH TEMPERATURE METALS

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These CINCINNATI® Shears give

"A most outstanding performance"

"Any job put on our Cincinnati Shears is routine," says C. E. Ball, Assistant Sales Manager of The Hill-Chase Steel Co., big Baltimore warehouse. "They have accomplished a most outstanding performance."

Faced with customers' demands for increased accuracy in sheared sheet, plate, and strip, more and more warehouses are discovering the profits which Cincinnati Shears can bring them.

The fast and sure way to get accuracy in shearing, slitting, and notching is to specify the Cincinnati line. Our representatives will be happy to discuss your application with you.

Photo Courtesy of The Hill-Chase Steel Co.

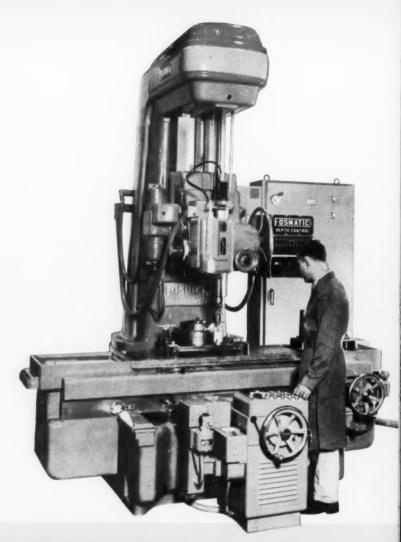
Shapers / Shears / Press Brakes

THE CINCINNATI
SHAPER ...



Cincinnati 11, Ohio, U.S.A.

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PRECISION



Numerical Control in three directions



DEPTH CONTROL developed by Fosdick, adds the ultimate third dimension to precision boring. Use random length tools for boring to depth under complete numerical control. Combine rapid depth control with horizontal positioning. preselected spindle speeds and feeds, coolant on-off, tool selection, even automatic tool changing, all by Fosmatic Numerical Control.

Tape or dial any depth. Absolutely no stops to preset.

Fosmatic Numerical Control easily fits into a cabinet small as your home refrigerator. The Fosdick system is electromechanical. Its electrical components are simple, easily

Always, with or without numerical control, you depend on a Fosmatic for precision within 0.0001".

Keep precision machining control in the front office. Relieve the operator of his "fear of error." Investigate—and invest in lower costs with Fosmatic precision, now. Write for Catalog PB-A.

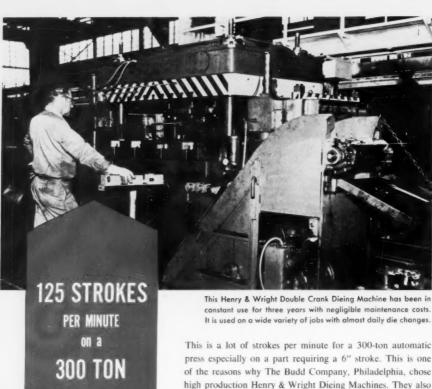
BORNG -OSDICK THE FOSDICK MACHINE TOOL COMPANY

THE FOSDICK MACHINE TOOL COMPANY CINCINNATI 23, OHIO

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March, 1960

MODERN MACHINE SHOP



This is a lot of strokes per minute for a 300-ton automatic press especially on a part requiring a 6" stroke. This is one of the reasons why The Budd Company, Philadelphia, chose high production Henry & Wright Dieing Machines. They also needed flexibility for a wide range of short-run jobs; accurate die guiding to assure minimum wear on expensive, multi-stage progressive dies averaging 8-stages each; automatic material feeding and parts ejection; quick and easy die changing . . . all so necessary to stay profitable in the highly competitive stamping business.

You'll find Henry & Wright machines will meet every production requirement. The 6" stroke, high tonnage job described in the headline is a severe test for any heavy automatic press. If you need more production, at competitive costs, for a variety of jobs, ask now about the high production Henry & Wright machines. Your inquiry will receive our prompt attention. Sizes from 25 to 500-ton capacity.

THE HYDRAULIC PRESS MANUFACTURING COMPANY

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PRESS

with a

6" STROKE

5 YEAR 11 WARRANTY

The Sheffield Corporation offers a 5 Year Quality and Reliability Warranty on Precisionaire Column Instruments now being shipped with Sheffield gaging tooling.

The Warranty is clear and positive, as reliable as the performance of the Precisionaire Column Instrument which it stands behind.

Precisionaire Column Instruments have performed so well over a 20 year period that Sheffield can make this important assurance of reliability – at no extra cost.

Sheffield Precisionaire Column Instruments are the most versatile and trouble-free air gages you can buy.

For reliable air gaging, specify Sheffield. Ask your Sheffield representative for details about this Warranty.



A subsidiary of the Bendix Aviation Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems . Machine Tools . Contract Mfg.

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March, 1960

MODERN MACHINE SHOP

47

NATIONAL ACME'S ZONE OF RESPONSIBILITY

INCLUDES ALL PHASES OF COST REDUCTION

Chick YOURS . . . Then Check National Acme

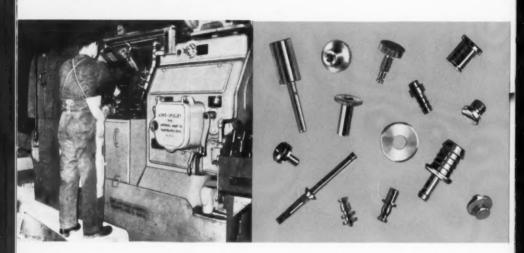
Direct Costs: these include direct dollar savings as realized by the McCullach Corporation . . . an "every day" job for Acme-Gridleys.

Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc.

Product Redesigns teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities. Direct Meterial Castst our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems.

Make-or-Buy Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment.

Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "onthe-spot" savings.



McCULLOCH CORPORATION LOGS 66% COST REDUCTION

... with Acme-Gridleys



Reduced cost-per-piece of tilt-lock knobs was but one of the enviable savings made possible for the Marine Products Division of the McCulloch Corporation by an Acme-Gridley RA-6 Spindle Automatic. In addition, McCulloch boosted output 200%, practically eliminated scrap losses, and greatly improved finish and final appearance of this small but critical part.

Previous production methods required one primary and two secondary operations. Now, complete machining—including deburring, is done in one automatic

operation on the Acme-Gridley.

Dramatic savings in the production of parts like this make Acme-Gridleys a vital, cost-saving cog in McCulloch's highly efficient production set-up. Evidence of this leading manufacturer's high regard for Acme-Gridley efficiency is the fact that 14 different parts for their popular 60HP "Flying Scott" are produced on the rugged, versatile RA-6 Automatic.

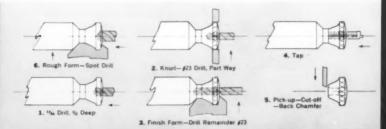
It will pay you to thoroughly study the savings possible with Acme-Gridleys. Call, write or wire for complete details on industry's most modern approach to tangible cost reduction.



National Acme The National Acme The National Acme The National

Sales Offices: Newark 2, N.J.; Chicago 6, III.; Detroit 27, Mich.





NEW SIOUX AIT S

DOES 101 JOBS IN HALF THE TIME



METAL WORKERS KIT NO. 270C



CHISEL -SHEARS BOLTS, SPLITS NUTS, pulls pins, breaks spot welds.

RIVET BUSTER -SHEAKS ALL TYPES OF RIVETS

PUNCH - PUNCHES OUT PINS, BOLTS. studs, rivets, bearing races, and pressed bearings.



SHEET METAL PUNCH — PUNCHES PERFECT HOLES FOR METAL SCREWS —A precision made sheet metal punch that will punch perfect holes for metal screws faster than you can put them in place.



BREAKS SPOT WELDS QUICKLY, easily, inexpensively. A hardened tool that will take long, hard, punishing use.



SCRAPER — SCRAPES AWAY RUB-BER COATING, insulation or almost anything without damage to metal.

GETS AT THOSE "HARD TO REACH" EXTENSION PLACES and shears bolts, rivets, CHISEL pins, breaks spot welds.



CRIMPER -

MAKES A STRONG NEAT, SHEET METAL JOINT, means faster, neater, better work, and more profit.

The SIOUX Air Slugger is one of the most useful of air tools. It will not create the hazard of fire or explosion and will save cost of torches and gas. Design features include a one piece barrel with no parts to get misaligned or wear out; and a cast iron handle that will survive the roughest treatment. It's light, sturdy, and Sloux dependable.



50

Look for SIOUX Tools in the yellow pages under "TOOLS, ELECTRIC"

BERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

AIR IMPACT WRENCHES® AIR SCREWDRIVERS® ELECTRIC IMPACT WRENCHES® DRILLS® SCREWDRIVERS® GRINDERS® SANDERS® POLISHERS® FLEXIBLE SHAFTS® PORTABLE SAWS® VALVE GRINDING MACHINES ABRASIVE DISCS.

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proven design features . . .

Here is the first in the all new, field tested line of heavy duty Nebel Lathes.

It is a versatile extension bed gap lathe, providing 26½" swing over the upper bed, 46" swing through the gap and 48" to 84" distance between centers in the base length.

It is built to complete A.S.A. standards and tolerances of accuracy for engine lathes, still maintaining Nebel economy.

- Heavy duty 3-bearing spindle with zero precision bearings.
- 18 spindle speeds through complete gear range . . . up to 1500 RPM . . . streamlined speed selection.
- 60 different feeds . . . 60 thread changes, all directly read.
- Automatic lubrication.
- Wide design carriage with 146 square inches of bearing surface on bed ways.
- Double-wall one piece totally enclosed apron with simplified controls.
- End gearing totally enclosed in self-lubricating housing.
- Power traverse heavy duty tailstock with rugged thrust lock.
- Rigid box girth design of upper and lower bed . . .
 hardened and ground steel bedways on upper bed.
- Maximum diameter in gap faced in one setting of tool.

Write for new, fully descriptive Bulletin No. 211.

Hebel Lathe Division - Nebel Machine Tool Corp. 3401 Central Parkway, Cincinnati 25, Ohio

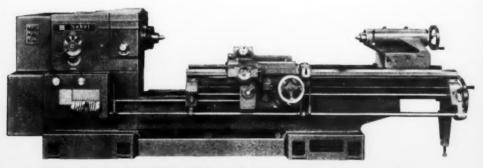


a rugged engine lathe

Nebel

HEAVY DUTY DOUBLE PURPOSE LATHE

entirely new, proven design



NEBEL MODEL HXB 26/45 HEAVY DUTY EXTENSION BED GAP LATHE

Lights slow size corteary. Actual wast size is thewn on the dial.

faster gaging ...

ELECTRIFYING RESULTS...

when you use the

ELECTRICATOR



(For each



MODELS
(Four limits, five categories)



(For indicating eccentricity, runaut, squareness

There's nothing quite like the Federal Electricator — so easy to apply — so economical — so accurate . . . a Miracle Movement Dial Indicator and two-limit, spindle-actuated switch combined. Use it with tolerance lights in place of your dial indicator for faster, more accurate bench gaging. Use it together with a signal unit for fully automatic inspection or automatic machine or process control.

The Electricator is a high precision unit — switching accuracy is better than 50 millionths on all models. Voltage across the switch is extremely low and switching current is in the order of one milliampere. Therefore, arcing and pitting of contacts is eliminated and accuracy is reliably maintained. The Electricator is calibrated, so it requires only one master.

All Electricator models incorporate the new Federal Miracle Movement which is so wear-resistant... so shock resistant... you will probably never have to repair or replace it. Six regular models are immediately available from stock. Four different graduations — .0001", .00025", .0005", .001". Prices from \$75.

The switching portion of the Electricator is available as a separate unit to operate tolerance lights and/or provide control limits without indicating actual size.

The Federal Eccentricator, a similar type of high precision unit, indicates eccentricity, runout, squareness, etc., without being influenced by normal piece-to-piece variations in size.

For more information, write . . .

FEDERAL PRODUCTS CORP. 6143 Eddy Street, Providence 1, R. I.

Ask FEDERAL First

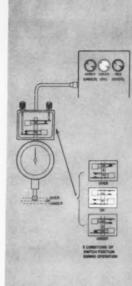
FOR RECOMMENDATIONS IN MODERN GAGES .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

FOR HIGH SPEED BENCH GAGING (Single or Multiple Dimensions)

It's easy to install the Electricator in place of the dial indicator on your present comparator when you need greater speed. The Electricator eliminates having to make borderline decisions so you get more reliable results . . . and faster results . . . using less skilled help, and with less operator fatigue. Many concerns have up-graded their manual gaging this economical way with great success.

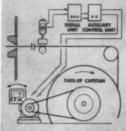
The Electricator offers the most economical way to make multi-dimension checks rapidly and reliably. The signal lights on its control panel instantly show the operator whether the piece is within tolerance or not. No need for operator to look at a group of indicators one by one in order to determine acceptability.





CONTINUOUS PROCESS CONTROL

Because the Electricator is compact, it can be installed easily on most continuous processes to indicate size trend accurately so correction can be made before scrap is produced. In many cases, Electricator, working into appropriate signal unit, can be used to control size so process automatically produces within tolerance.

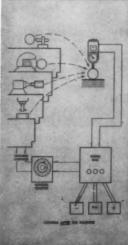


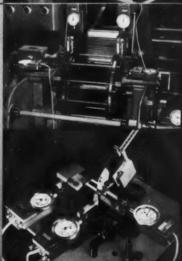


HIGH SPEED AUTOMATIC MULTI-DIMENSION INSPECTION AND MACHINE CONTROL

Electricators have rapid response — can gage and sort up to 6,000 pieces per hour, providing up to 5 sorting categories. Wide range adjustment of limits to suit tolerances. Use of low switching voltage and current provides high-reliability performance.

Electricator can also provide post-process machine control in addition to highspeed gaging and sorting. Using simple control counter, gage automatically stops machine when tolerance limits are exceeded.







In designing for air operation, the engineer can choose the method of valving he prefers—and still have all the advantages of integral valve and cylinder construction.

Six different built-in valve arrangements give the engineer every latitude in pneumatic design.

If he prefers to use 8-12 volt electrical control with its simplified wiring, Bellows has it. If he prefers to use 115 volt control and JIC standards, Bellows has it. If he requires low or high voltage explosion-proof control, Bellows has it. Should his design require full pneumatic control, Bellows has it. Or should he

wish to control his pneumatic circuits manually or through mechanical linkage or cams, Bellows has it.

Unlike conventional air cylinders which require separate remote directional and speed control valves and dual piping, the Bellows Air Motor is a complete power unit with directional valve and dual speed control valves built-in as an integral part of the unit. Only one air connection, which can be made with flexible hose, is required.

Integral valve and cylinder construction means quick response, more positive response, more precise control and more economical operation.

The Bellows Air Motor is made in five bore sizes: $1\frac{1}{4}$ ", $1\frac{3}{4}$ ", $2\frac{1}{2}$ ", $3\frac{5}{8}$ ", and $4\frac{1}{2}$ ", and in any stroke length.

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Four-color, 20-page bulletin describes the complete line of Bellows Air Motors. Free on request. Address Dept. AH-1159, The Bellows Co., Akron 9, Ohio.

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

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... ON <u>NEW PINES HIGH SPEED MODEL 3-T PRESS</u>. This new progressive bending press has proven the key to increased production, reduced costs on a variety of jobs in such industries as automotive, furniture, appliance, and farm equipment.

"INCREASED PRODUCTION" . . . reported by Bunting Co., Inc., Philadelphia. Accurate, quality bends are produced on the 3-T three times faster than by conventional methods. Speeds up to 1500 bends an hour on tubular parts up to 1" O.D.

"BROADER FLEXIBILITY"... says Kalamazoo Furniture Company, Kalamazoo, Michigan. Wide open tooling area permits rapid progressive bending in varied planes. Up to 10 different bend angles are automatically produced in a single setup with maintained plus or minus ½ degree accuracy.

"FASTER SETUP"... reported by Configured Tube Products, Bellwood, Illinois. Pick-out pins in indexing turret permit quick bend angle selection, are easily stored with stop gauges for repeat work. Quick change tooling contributes to fast, 15 minute setups.

ON MODEL 6-T PRESS. At Chromcraft Corporation, St. Louis, this multiple bending press saves time simultaneously forming "U" frames in two and three tubes per cycle at speeds up to 2000 bends an hour.

Parts Corporation, Toledo, progressive bending of tubes up to 2" O.D. has increased efficiency 20% with speeds up to 800 bends an hour and near elimination of pass-along work-handling.

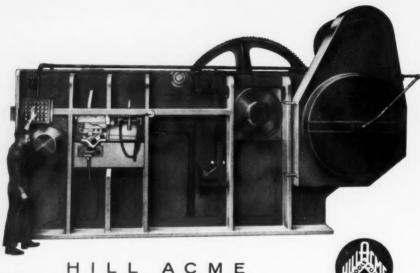
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for production cutting of heavy billets

SIMPLE DESIGN

The No. 1200 HILL ACME BAR-BILLET shear cuts large diameter squares of various tensiles. The basic principle of the lever and fulcrum is employed to insure maximum efficiency with low power input.

HIGH PRODUCTION

With a free running speed of 26 cuts per minute the production of square, accurate lengths will appreciably reduce cutting costs.

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Knives will accommodate many sizes of round: flats, squares or special shapes without the necessity of knife change.

LOW COST

Initial machine cost is attractive and maintenance cost comparisons are impressive.

PROVEN EFFICIENCY

Now proven through four years of successful operation in nationally known plants. Available with fully automatic, semi-automatic or hand feed.

SIZE RANGE

HILL ACME BAR-BILLET shears are made in a range of sizes to efficiently accommodate every commercial requirement. Available in either right or left hand models.



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Right & Left Hand High Speed Taps-Dies & Thread Plug Gages

| SIZE | THREADS PER INCH | 1 SIZE | THREADS PER INCH | 1 SIZE | THREADS PER INCH | 1 SIZE | THREADS PER INCH |
|------|----------------------------------|--------|-------------------------------------|---------|------------------------------------|---------|---------------------------|
| 000 | 160 | 13/64 | 24-28-30-32-36-40 | 41/64 | 11-18-24 | 1-1/2 | 7-8-9-10-13-14-16-18-20- |
| 000 | 120 | 7/32 | 20-22-24-26-27-28-30-32- | 21/32 | 10-11-18-20-24-27-32-40 | | 24-27-28-32-40 |
| 00 | 90-96-112 | | 36-38-40 | 11/16 | 10-11-12-14-16-18-20-22- | 1-17/32 | 7-12-18 |
| 0 | 56-64-72-76-80 | .227 | 24 | | 24-27-28-30-32-36-40 | 1-9/16 | 6-8-10-12-14-16-18-20-24- |
| 1 | 48-56-60-64-80-90 | 15/64 | 20-22-24-28-36-40 | 23/32 | 11-12-16-18-20-27-32-36-40 | | 32-40 |
| 2 | 48-52-54-56-60-72-80 | 1/4 | 10-12-14-16-18-22-23-24- | 47/64 | 10-12-16 | 1-5/8 | 5-515-6-8-10-1115-12-13- |
| 3 | 36-40-60-64-72-80 | | 25-26-27-30-32-36-38-40- | 3/4 | 8-9-11-12-14-15-18-20-22- | 1 | 14-16-18-20-24-28-32-40 |
| 4 | 30-32-38-42-44-56-60-64- | 1 | 48-50-56-60-64-72-80 | | 24-26-27-28-32-36-40 | 1-11/16 | 8-10-12-14-16-18-20-24-32 |
| | 72-80-90 | 17/64 | 12-18-20-24-27-28-32 | 49/64 | 10-16 | 1-23 32 | 5 |
| 5 | 22-27-30-32-36-38-42-48- | .277 | 40 | 25/32 | 10-12-16-18-20-24-27-32-40 | 1-3/4 | 5-6-8-10-12-13-14-16-18-2 |
| | 50-56-60-64-72-80 | 9/32 | 16-18-20-24-26-27-28-32- | 800 | 16 | | 24-28-32-40 |
| 6 | 24-28-30-36-38-42-44-48- | | 36-40-46 | 13/16 | 8-10-12-14-16-18-20-24-27- | 1.767 | 18 |
| | 56-60-64-72-80 | 19/64 | 18-24 | | 28-32-40 | 1.7715 | 12 |
| 7 | 28-30-32-34-36-38-40-48-64 | .300 | 28 | .835 | 16 | 1-13/16 | 8-10-12-14-16-18-20-24-32 |
| 8 | 24-26-28-30-38-40-44-48- | 5/16 | 12-14-16-20-22-26-27-28- | 55/64 | 6-12 | 1-7/8 | 5-8-10-12-14-16-18-20-24- |
| | 56-60-64-72-80 | | 30-32-36-40-48-50-56-64 | 27/32 | 9-10-18-20-24-27-32-40-48 | | 32 |
| 9 | 24-28-30-32-36-40 | 21/64 | 16-18-20-24-36 | .850 | 14 | 1-29 32 | |
| 10 | 18-20-22-26-28-30-36-40- | 11/32 | 16-18-20-22-24-26-27-28- | 7/8 | 8-10-11-12-13-16-18-20-24- | 1-15/16 | |
| | 48-56-60-64-72-80 | | 32-36-40 | | 26-27-28-32-36-40 | 12 | 412-6-8-10-12-14-16-18-20 |
| 11 | 20-22-24-28-30-32-36 | 23/64 | 16-24 | 29/32 | 9-12-14-20-24-27-28-32 | 1 | 24-28-32 |
| 12 | 20-22-26-27-30-32-36-38- | .365 | 28 | 15/16 | 8-9-10-12-14-16-18-20-24- | 2-1/16 | 8-10-12-14-16-18-20-24-32 |
| | 40-48-56-60-64-72-80 | 3/8 | 12-14-18-20-22-26-27-28- | 1.2.10 | 27-28-32-40 | 2-1/8 | 412-8-10-12-14-16-18-20 |
| 13 | 20-22-24-28-32 | 3/8 | 30-32-36-40-48-56-64 | 31/32 | 9-12-16-18-20-24-28-32 | 2-3/16 | 8-10-12-14-16-18-20-24 |
| 14 | 14-16-18-26-28-30-32-36-40 | | | 31/34 | 5-9-10-11-12-16-18-20-24- | 2-1/4 | 412-8-10-12-14-16-18-20-2 |
| 15 | 18-20-24-28-32 | 25/64 | 14-16-18-20-24-27 | 1. | 26-27-28-30-32-36-40-48 | 2-5/16 | 8-10-12-14-16-18-20-24 |
| 16 | 16-18-20-22-24-28-32-36 | .402 | 24 | | | 2-3/8 | 4-8-10-12-14-16-18-20-32 |
| 17 | 16-20 | 13/32 | 12-14-16-18-20-24-27-32-40 | 1-1/32 | 8-12-14-16-18-20 | 2-7/16 | 8-10-12-14-16-18-20 |
| | 16-18-20-24-32-40 | 27/64 | 14-20-24-28-32-36 | 1-3/64 | 14 | 2-1/2 | 4-6-8-10-12-14-16-18-20 |
| 19 | 18-20 | | | 1-1/16 | 8-10-12-14-16-17-18-20-24- | 2-9/16 | 8-10-12-14-16-18-20 |
| 22 | 14-16-18-20-24-32 16-18-20-24 | 7/16 | 10-12-16-18-22-24-26-27- | 1-11-10 | 27-28-32-40 | 2-5 8 | 4-8-10-12-14-16-20 |
| 24 | 14-16-18-22-24 | | 28-30-32-36-40-48-56 | 1-3/32 | 7-8-9-12-14-16-18-20-32 | | 8-10-12-14-16-18-20 |
| 26 | 14-16-20-24 | 29 64 | 12-14-16-20 | | | 2-3/4 | 4-8-10-12-14-16-18-20-32 |
| 28 | 14-16-20 | 15/32 | 12-14-20-24-27-28-32-40 | 1-1/8 | 8-10-14-16-18-20-24-27-28- | 2-7/8 | 4-8-10-12-14-16-18-20-24 |
| 30 | 14-16-20 | 1/2 | 10-11-12-14-16-18-22-24- | 1 | 32-40 | 1 | 12 |
| 1/16 | 56-60-64-72 | 1/4 | 26-27-28-30-32-36-40-48- | 1-5/32 | 7-8-9-12-14-16-18-20-24-32 | 2-15/16 | 8-10-12-14-16-18-20-32 |
| 5/64 | 56-60-64-72 | | 56 | 1-11/64 | 18 | 3 | 315-4-8-10-12-14-16-18-20 |
| 3/32 | 32-36-38-48-50-56-60-64 | | | 1-3/16 | 7-8-10-12-14-16-18-20-24- | 3-1/8 | 4-8-10-12-14-16-20 |
| 107 | 52 | 33/64 | 12-13-20-24 | 1-3/10 | 7-8-10-12-14-16-18-20-24- 32-40 | | |
| 7/64 | 36-40-42-44-48-50-56 | 17/32 | 10-12-13-14-16-18-20-24- | | | 3-3/16 | 4-8-10-12-14-16-20 |
| 1/8 | 30-32-36-38-40-48-56-60-80 | | 27-28-32-40 | 1-1/4 | 8-10-14-16-18-20-24-27-28- | 3-1/4 | 4-8-10-11-12-14-16-18-20 |
| 132 | 50 | .550 | 24 | 1 | 32-40 | 3-3/8 | 4-8-10-12-16 |
| 0/64 | 30-32-38-40 | 9/16 | 10-13-14-16-20-24-26-27- | 1-5/16 | 6-7-8-10-12-14-16-18-20- | | |
| 148 | 38 | 7/18 | 28-30-32-36-40-48 | | 24-27-28-32-40-48 | 3-1/2 | 4-8-10-12-16 |
| 5/32 | 24-26-28-30-32-36-38-40-50 | 37.64 | 28-30-32-36-40-48 10-12-18-20-27 | 1-3.8 | 5-8-10-14-16-18-20-24-32-40 | 3-3/4 | 4-8-10-12-16 Many more |
| 1/64 | 24-26-30-32-36-38-40 | | | | | 4 | 4-8-10-12-16 sixes in |
| 1/16 | 12-18-20-22-24-26-27-28- | 19/32 | 12-18-20-24-28-32-36-40 | 1-13/32 | | 1.5 | stock up |
| | 30-32-36-40-48-56-64-72 | 5/8 | 9-10-12-13-14-16-20-24-26- | 1-7/16 | 6-8-10-12-14-16-18-20-24- | 4-1/8 | |
| 198 | 24 | | 27-28-30-32-36-40-56 | | 27-28-32-40 | 4-1/4 | 4-8-10-12-16 |

LEFT HAND N.C. (USS)-N.F. (SAE) SIZES

| | ZEE | ABOVE | SECTIO | N FOR | MORE SI | ZES | |
|------|----------|-------|---------|-------|---------|--------|---------|
| SIZE | THREADS | SIZE | THREADS | SIZE | THREADS | SIZE | THREADS |
| 0 | 80 | 8 | 32-36 | 7/16 | 14-20 | 1" | 8-12-14 |
| 1 | 64-72 | 10 | 24-32 | 1/2 | 13-20 | 1-1/8 | 7-12 |
| 2 | 56-64 | 12 | 24-28 | 9/16 | 12-18 | 1-1/4 | 7-12 |
| 3 | 48-56 | 14 | 20-24 | 5/8 | 11-18 | 1-5/16 | 6-12 |
| 4 | 36-40-48 | 1/4 | 20-28 | 11/16 | 11-16 | 1-3/8 | 6-12 |
| 5 | 40-44 | 5/16 | 18-24 | 3/4 | 10-16 | 1-7/16 | 6-12 |
| 6 | 32-40 | 3.8 | 16-24 | 7/8 | 9-14 | 1-1/2 | 6-12 |

and 'UNDERSIZE' 'OVERSIZE'

RIGHT AND LEFT HAND N.C. AND N.F. SIZES

MACHINE SCREW .003, .005, .010 #2 to #5 Plus or Minus MACHINE SCREW #6 to #14 Plus or Minus .002, .003, .005 FRACTIONAL 1/4" to 1-1/2" Plus or Minus .003, .005, .010 .015, 1/64, 1/32

| | ht & Left H an' or Spira | | | Size |
|----------------------|--|-------|-----------------------------|------|
| Size | Threads | | | 5 |
| 2 | 56 NS 56 NC, 64 NF | 7/8 | 9 NC, 14 NF NC, 12-14 NF | 10 |
| 9/16 5/8 11/16 | 12 NC, 18 NF 11 NC, 18 NF 11 NS, 16 NS | 1-1/4 | 7 NC, 12 N 6 NC, 12 NF | 1/4 |
| 1/4 | 10 NC, 16 NF | 1-1/2 | 6 NC, 12 NF | 5/16 |

Right Hand-Unlisted 'Pu And Extra Length Tay Threads 36-40 NC, 48 N 3/8 40 NC, 44 N 7/10 32 NC, 40 N 1/2 32 NC, 36 N 9/10 24 NC, 32 N 9/10

24 NC, 28 NF

28 NF 24 NF

| ulley' | Right h | | | | |
|--|---|---|--|---|--|
| ps eads | "NPT" Taper"NPT" Size Thread | Size | Thread 27 | "N | ENGTHS PT" & NPS" |
| 24 NF 20 NF 20 NF 12 NC 18 NF 18 NF 16NF | 1/16 27 1/4 27 2-1/2 8 3 8 3-1/2 8 4 8 | 1 1-1/4 1-1/2 2 2-1/2 3 3-1/2 | 8 111/2 111/2 111/2 8 8 | Size 1/16 1/8 1/4 3/8 1/2 3/4 | Thread 27 27 18 18 14 14 |
| CGNI | Also British | Also | British | 1 | 111/2 |

| | thand ' | | |
|------|---------|-------|-----|
| , | | | |
| 1/16 | 27 | 1-1/4 | 115 |

Thread 1/2 9/16 9/16 5/8 3/4 Also Larger Sizes Ni /16 27 18 18 18 18 1-1/2 3/8 18 1115 1/2 14 2-1/2 14 SPECIAL REAMERS

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ing information:

a Kind of material being machined.

b) Depth of help, through or bottom.

C Tap to be used kortiontally or vertically.

c) Will tap turn, or is piece expected to be turned.

(i) Will tap turn, or is piece expected to be turned.

(ii) Wind tap be appected to be done in one pass.

(ii) Would tap be backed out of hele, or machine stopped for release of tap. submit thread length, and overall length of tap

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When first introduced in 1946, Latrobe's Desegatized process of manufacture involved new and revolutionary melting techniques. This process established hew standards of quality in high speed steels and high alloy die steels. Here were steels fully uniform for the first time... no harmful carbide segregation... steels free from porosity... no weakening centerline inclusions!

Today, over 30 grades of Latrobe's tool and die steels are produced by the Desegatized process. These are available in regular analyses or XL and FM analyses containing properly distributed alloy sulphides for increased machinability. For manufacturers and users of cutting tools and metalworking dies, the full uniformity of Latrobe's Desegatized steels continues to mean extra toughness, greater wear resistance and reliable response to heat freatment.

Latrobe's research and development program continues. Not only will the metalworking industry benefit from better Latrobe tool and die steels, but the rigorous quality standards established through experience have been applied to the field of high strength and high temperature steels and alloys now produced for Space Age applications by Latrobe—Metalmasters for Industrial America.

Have a cutting tool, production die or specialty steel application problem? Call upon experience . . . Call Latrobe!



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March, 1960

MODERN MACHINE SHOP

59



UNIVERSAL R & R
DEBURRING TOOLS
with spring-loaded
retractable blade
give precision-cut edge
or chamfer at high
speed without
chatter





Adjustable spring tension allows continuous contact with work-piece to eliminate chatter at high operating speeds. Free-floating blade permits self-alignment and uniform stock removal. Made in a full range of sizes to 1½" diameter.

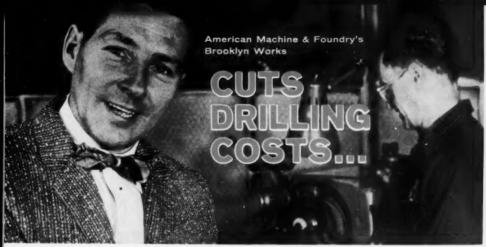
Blades of the Universal R & R Deburring Tool are made of high speed steel, precision hardened and ground to close tolerances for interchangeability. May be used as horizontal deburrer in portable electric drill or in standard drill press.

For full information, write to Universal Engineering Company.



UNIVERSAL ENGINEERING COMPANY · FRANKENMUTH 9, MICHIGAN

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Ralph Mazza, Foreman, Tool Grinding and Small Tool Department



At AMF, the Cincinnati SPIROPOINT sharpensspiral point drills for 10 radials, 60 sensitive drill presses and 20 multiple-spindle multiple head units.

"... 20% more holes per grind"

"... Hole size tolerances of .0015" to .002" on smaller diameters"

"... More than 15% less downtime on our multiplespindle drilling machines"

"... Less costly fixtures required"

By using Cincinnati SPIROPOINT® Drill Sharpener to apply the new *spiral point* geometry to standard twist drills, AMF reduces drilling costs right across the board—in time, tools, materials, maintenance.



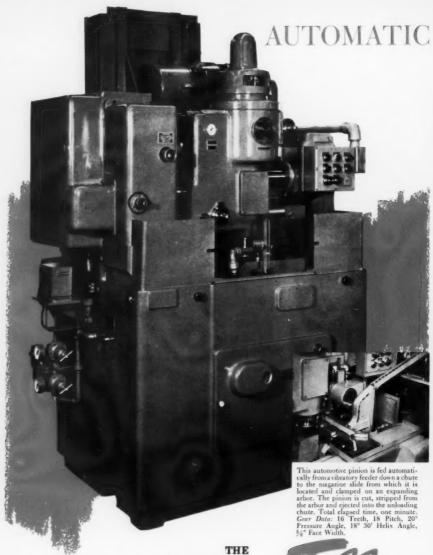
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CINCINNATI LATHE AND TOOL CO.

3207 Disney Street, Cincinnati 9, Ohio







PRECISION LINE FEllows

WORK HANDLING

Is A Natural Complement to the High Production Rates of the Fellows 4GS Gear Shaper

Although designed for both manual and automatic loading, the 4GS Fellows Gear Shaper makes best use of its high production rates when equipped with work handling devices.

The physical construction of the machine is such that it may be easily adapted for use with magazines and chutes for automatic loading and unloading at substantial cost savings on continuous production runs.

Ask your Fellows representative about the many advantages of automatic work handling with the 4GS Fellows Gear Shaper, or write direct to the Fellows Gear Shaper Company.



These internal clutch parts are handled in the same manner as the 16-tooth external pinion, except that the cutterspindle is automatically stopped at the top of its stroke for clearance during the loading and unloading cycle. Cutting time is 1½ minutes. Gear Data: 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, Spur, ½6° Face Width.



This transmission cluster gear shaft is handled by two sets of air-operated "fingers" mounted on a turret. As the turret rotates, one set of fingers moves the finished piece to the unloading chute while the other set brings the new blank into position. Cutting time is 55 seconds. Gear Dala: 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, External Spur, 3½° Pace Width.



This automotive stem pinion is handled in the same manner as the cluster gear. In both cases, safety devices prevent the machine from starting unless the blanks are in the correct cutting position. Loading and unloading chutes may be hand or conveyor fed. Cutting time is 2½ minutes. Gear Data: 17 Teeth, 10 Pitch, 19° 30° Pressure Angle, 32° 51′ Helix Angle, ¾° Face Width.

Gear Production Equipment

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U. S. A. Branch Offices:

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SQUARE BROACHES — 1/4" to 3/4" holes

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A. S. T. E. SHOW
DETROIT, APRIL 21-28



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Meetings

Important Meeting
Dates

MARCH 7-8 • Steel Founders' Society of America, Annual Meeting, Drake Hotel, Chicago. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

MARCH 14-18 • National Association of Corrosion Engineers, National Conference and Corrosion Show, Memorial Auditorium, Dallas, Association headquarters: 1061 M & M Bldg., Houston 2, Texas.

MARCH 23-25 • Pressed Metal Institute, Spring Technical Meeting, Carter Hotel, Cleveland. Institute headquarters: 3673 Lee Rd., Cleveland 20, Ohio.

MARCH 29 • Material Handling Institute Inc., Spring Meeting, Pittsburgh-Hilton Hotel, Pittsburgh. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pennsylvania.

APRIL 3-6 • National Screw Machine Products Association, Annual Meeting, Ambassador Hotel, Los Angeles, Association headquarters: 2860 E. 130th St., Cleveland 20. Ohio.

APRIL 3-8 • Nuclear Congress and Atomic Exposition, Coliseum, New York. Coordinator: Engineers Joint Council, 29 W. 39th St., New York 18, New York.

APRIL 4-7 • American Management Association, Packaging Show and Conference, Convention Hall and Shelburne Hotel, Atlantic City, N. J. Association headquarters: 1515 Broadway, New York 36, New York.

APRIL 21-28 • American Society of Tool Engineers, Tool Show and Annual Meeting, Detroit Artillery Armory and Statler-Hilton and Sheraton-Cadillac Hotels, Detroit. Society headquarters: 10700 Puritan Ave., Detroit 38, Michigan.





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You can't recognize a value by its price alone. This is true of all types of grinding wheels and has special significance in diamond wheels in view of their high initial cost.

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Clausing geared-head lathes do lead their field in capacity, performance and value. Here's why:

They're bigger in capacity than other lathes in their class. Larger spindles, larger thru-hole capacity, larger bearings for heavier work. 17" lathe spindle, for example, has 3½ "s" thru-hole—15" lathe, 2½ "hole—13", 1½ "hole.

Have heavy-duty construction throughout. Bed ways are induction hardened. Gears in head and quick-change box run in bath of oil. Power feeds are taken from separate feed rod, lead screw is used for thread cutting only. Spindles are high-tensile steel.

Built for precision performance - to Amer-

ican standards of toolroom lathe accuracy. Have Gamet Micron tapered roller bearings with oil flow lubrication — the most advanced and accurate bearings known to industry.

Each is an outstanding value. 13° cabinet base models, including motor and controls, start at \$2302; 15° cabinet base at \$3221; 17° at \$5070. You owe it to yourself to investigate before investing in any lathe.

Lathe Capacities: 17" lathe: 54" and 75" centers, 28" swing in gap; 15" lathe: 30" and 48" centers, 24" swing in gap; 13" lathe: 24" and 36" centers, 18" swing in gap.

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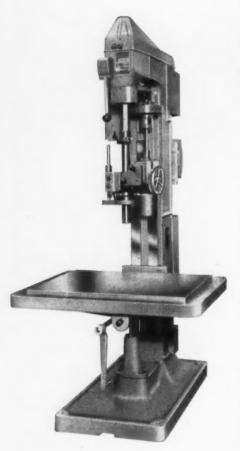
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March, 1960

MODERN MACHINE SHOP

71



automatic cycle drilling machine

You can chop your time costs with automatic set-ups on this new Avey machine, and still take advantage of the low cost and flexibility of a standard unit.

Adjustable rapid power traverse, feed, and rapid return of the spindle are the features which permit automatic transfer or rotary index fixturing.

At the same time, you get adjustable feeds, speeds, table travel, head travel, and Avey's advanced spindle construction.

The machine is available with No. 2, 3, and 4 Morse Taper; 1 to 3 HP motors; single or multiple spindles. Your request for additional information will be promptly answered. Avey Division, The Motch & Merryweather Machinery Co., Box 1264 Cincinnati 1, Ohio.

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72



- * MILLS SMALL PARTS MUCH FASTER.
- → DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT. Replaces expensive production machinery—or releases it for other jobs.
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- ★ YOU GET A BETTER PRODUCT—the result of ABSOLUTE ACCURACY.
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- ★ UNIQUE VERSATILE. Nothing else like it. One or several machines can be the answer to some of your production problems.

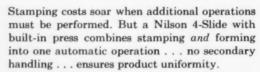
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-Combine Operations on a NILSON!



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Solution: A simple progressive die and ingenious 4-slide forming tools are producing this piece at the rate of two finished parts per second. Production costs are substantially lower than if tooled for a conventional press.

With nine standard working motions available on a Nilson 4-Slide, production performance is limited only by the ingenuity of the tool designer!

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Parts and production data, courtesy of









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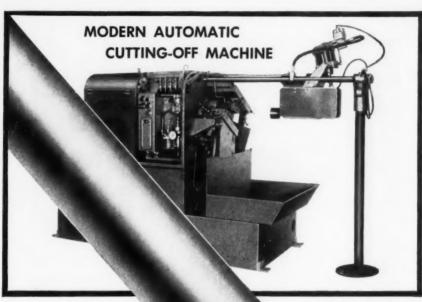
Plaza Tool & Die Corp., Long Island City, N. Y.



E A. H. NILSON MACHINE CO.

627 Bridgeport Avenue . Shelton, Conn.

AUTOMATIC WIRE & RIBBON METAL FORMING 4-SLIDE MACHINES . WIRE & STOCK REELS . WIRE STRAIGHTENING EQUIPMENT . AUTOMATIC STAPLE FORMING MACHINES . SPECIAL WIRE FORMING EQUIPMENT For more data circle 374 on Postpaid Card



Fast cut-off in lengths from a fraction of an inch to several feet with micrometer accuracy. Handles any length of stock and cuts any material that can be turned—bar stock up to 3" O.D.—tubing up to 8" O.D. Will cut-off, form, groove, flange and chamfer in a single operation—at a high rate of speed.





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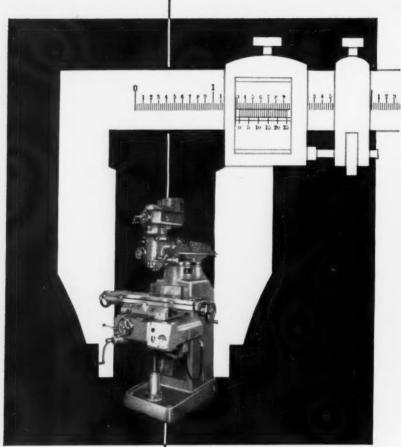
Describes all models. Complete specifications. Shows automatic bar feeder that handles entire load of stock with no operator attention, even with random lengths. Also, hot spinning machines and Safety Drill Tables.



103

MODERN MACHINE TOOL COMPANY

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Booth 1723



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● 1½ HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity... More rigidity, more accuracy... Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity... More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

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The New Standard line of Rodgers Platen Presses has been designed to greatly simplify press selection. From the basic press styles, one may be selected and combined with varied pumps and controls, automatic, semi-automatic or pressure sensitive, to give the desired speed and performance. This results in savings of "custom" engineering and costs.

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Rodgers 100 ton 30" x 30" bed size with complete one cycle automatic control for deep drawing.

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Rodgers 100 tan press, 36" x 36" bed with single lever pressure sensitive manual control.



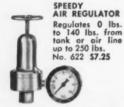
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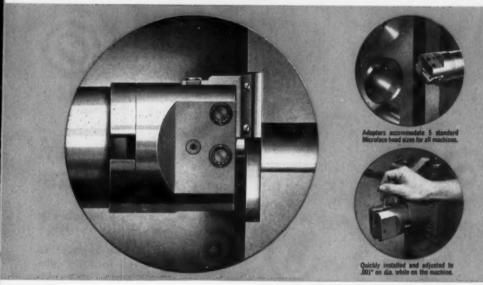
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AT BOOTH 427 ASTE SHOW, April 21-28 . DETROIT

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(Patent Pending)



For boring machines, turret lathes and heavy drilling equipment,

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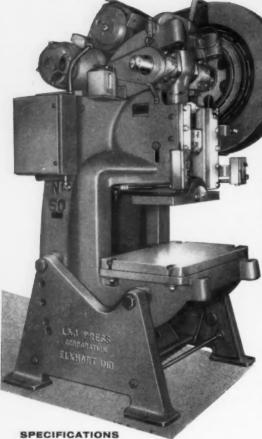
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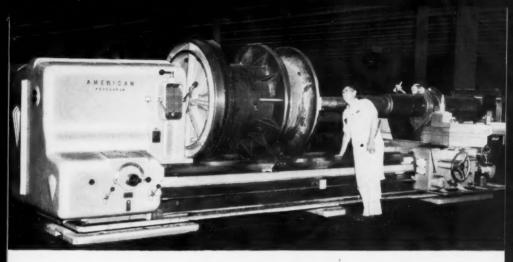
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Any question about the capacity of "AMERICAN" Lathe Spindle bearings or the stiffness of "AMERICAN" Spindles is certainly answered by this illustration.

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This is a 60 horse power lathe with spindle and spindle bearings of tremendous capacities, consequently is ideally adapted to "elephant" operations of this nature and there are other exclusive design features contributing to the excellence

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The many ultra modern and superlative features of "AMERICAN" Deluxe Model Pacemakers are described and thoroughly illustrated by bulletin No. 150. May we send you one?



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THE OK TOOL CO., INC., 800 Elm St. Milford, New Hampshire
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HARDINGE ELMIRA. N.Y.

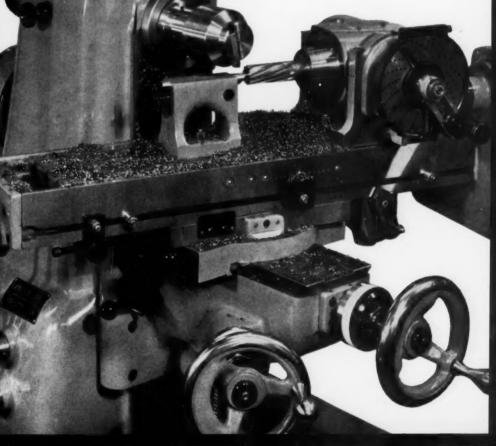
High Speed Precision MILLING MACHINES



Too Small for Heavy Duty Millers.

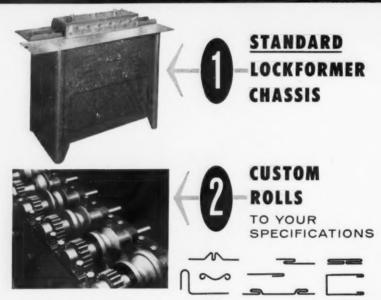
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GB rounds out the Brightboy line—the only complete, comprehensive STOCK LINE of multi-use rubber-bonded abrasives. Wheels, sticks, rods and blocks for machine and manual operations bring a wide, revolutionary concept to finishing—work saving applications not previously associated with abrasive uses.

With the introduction of the new Semi-Firm GB Binder, the Brightboy line now consists of FOUR BASIC RUBBER-CUSHIONED BINDER GROUPS: ST, Soft; GB, Semi-Firm; BL, Firm; TT, Tough. New GB combines the advantages of the Soft ST Binder with the durability of the Firm BL. Each of these four basic groups is made in an extensive range of Aluminum Oxide and Silicon Carbide abrasive grains. An additional binder, Fine-Tex, is compounded with pumice abrasive. All are available from STOCK.

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America's Pioneer Manufacturer of Rubber-Bonded Abrasives

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TAPER SHANK RIPPING LATTICE BAR TENON POWER HAND SCREW STRAIGHT
PUNCH PUNCH PUNCH PUNCH PUNCH SHANK



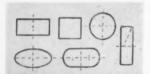
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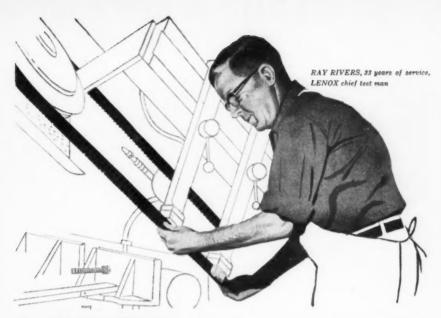
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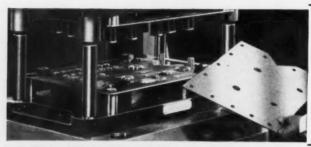




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March, 1960

MODERN MACHINE SHOP

93



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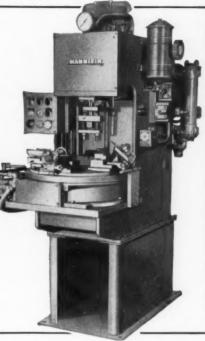
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modern machine shop

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modern machine shop

431 Main St. Cincinnati 2, Ohio



Fred W. Vogel

Over the Editor's Desk

ONE THOUSAND SALESMEN

"Believe it or not, that's what we have in our Cleveland plant," says L. M. Cole, Vice President-Sales of The Warner & Swasey Company. "Every production employee is a salesman for the machine tools they build."

How come? It's a practice, Mr. Cole explains, that "just grew"—with informal but sincere encouragement—out of the nature of the company's products and the character of its customers.

A visitor to Warner & Swasey—a potential buyer of machine tools—is usually taken first to the sales demonstration room, where latest models, in operation, are on display. But that is not enough. The visitor usually wants to see for himself how the machines are built. So his host takes him on a tour of the shop.

The visitor is curious. He wants to know just what work is being done on a particular machine. He asks the details of a certain operation. How do you do so-and-so, and why? This is natural, because many of the visitor's production problems, in his own plant, may be similar to those encountered in the manufacture of machine tools.

This is the point at which the operator of a machine, or the assembly hand, turns salesman—with the approval, and if need be, the aid, of the foreman. The operator answers the visitor's questions. He does so easily and naturally, because it is taken for granted that this is what he is expected to do. And he likes it! Instinctively, without thinking about it, he reveals pride in his work and pride in the product he is helping to build. He's not "following instructions"—he's just "doing what comes naturally." It may go something like this:

Visitor: "What type of micrometer is that?"

Operator: "This is a barrel mike. It's more accurate for this type of

Over the Editor's Desk . . .

reading than a dial indicator. Before boring in the turret, one thing I have to check is how well the ram lines up with the spindle."

Visitor: "What kind of a tolerance do you have to hold in lining up?"

Operator: "Well, the ram can't run downhill at all, and we run uphill—
in this direction—0.00025 inch to 0.00075 inch in six inches.

Of course, those are my outside limits. The machine you get would probably be a good deal closer than that!"

Does it help to sell? "It certainly does," says Mr. Cole. "Many a sale that is started in the demonstration room is clinched out in the plant. We sell the quality of our people as strongly as the quality of our machines."

But now for a different—and equally important—side of the picture. How does Prosper Schaffer, Works Manager, feel about it?

"Greatest morale builder you can imagine," he says. "The man who sells a visitor on how carefully he does things will sell himself too. And it certainly leads to a better understanding, on the part of our whole shop organization, of the problems our salesmen face in selling machine tools in a competitive market."

* * * modern machine shop * * *

"HOBE"

In the article "Producing Honeycomb Blankets" published on pages 114 and 115 of the January issue of *Modern Machine Shop*, the word "HOBE" appeared several times. A registered trademark of Hexcel Products Inc., 2332 Fourth St., Berkeley 10, Calif., the word "HOBE" was devised at Hexcel to express "HOneycomb Before Expansion." In order that Hexcel may protect its trademark, it is required that the word be noted as a trademark of the company. Thus, in the article under discussion, the word should have appeared as "HOBE®" and should have been indicated as the trademark of Hexcel Products Incorporated.

* * * modern machine shop * * *

NEXT MONTH

If you want to see the latest in metalworking tools, equipment and supplies that manufacturers are offering to the trade, carefully check the April issue, which will highlight the ASTME Show in Detroit.

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Plus other features, too, such as: Rugged, onepiece column and base casting • Greased-for-life precision ball bearing spindle • Instantly variable hydraulic table speed • Variable speed hydraulic cross feed and continuous cross feed • Powered vertical movement of wheel head.



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Report from Washington

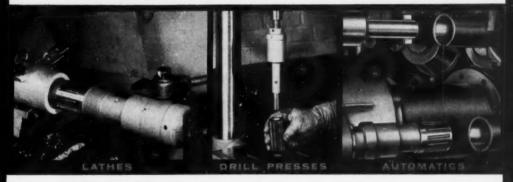
on Events Which May Affect You and Your Job

- THE OUTLOOK FOR MACHINE TOOLS for 1960 continues bright. New orders will rise and sales will go up 25-30%. Prices, too, will rise—about 5%, with labor and materials costs. Tool-builders will still be plagued, however, by falling exports, rising imports, and sales of surplus government tools.
- MONEY WON'T GET ANY TIGHTER THIS YEAR—that is what many government officials and leading bankers are now predicting. They find the recent dip in the interest rates the Treasury must pay on its obligations significant. It reflects a substantial slowing down in the pace of business borrowing. Added to the doubts created by the easing of money has been the start-of-the-year weakness in the stock market. In turn, this weakness is related to business events. Volume of auto sales has not been as great as expected and the build-up in steel inventories has moved at a faster-than-expected pace. There's always the possibility that this softening is only temporary. Despite those signs, the experts could be wrong. There could be some tightening late in the Spring. The tax liability of corporations will be huge; so they will have to borrow. Many different lines will still be adding to their inventories—and this will require some new bank loans.
- PRESSURE OF INFLATION WILL SOON BE NOTICEABLY EASIER, say government economists—even if another period of tight money should develop late this Spring. They don't claim that the wage-price spiral has ended. But there will be fewer... and smaller... price hikes this year. (The Consumer Price Index will still go up, but, largely because farm prices will be firming.) Country is now settling down to era of slower erosion of the dollar. Here's what's behind this optimism about easing inflation:

The steel settlement was not as large as in recent year, despite the head-

roughest part surfaces finished to 4 micro in. or less

in one pass ... on any machine!



• microller, burnishing tool finishes or sizes at FEED RATES OF 8 TO 12 IN. PER MIN.!

- CUTS PRODUCTION TIME, COSTS, 90% AND MORE!
- Tool finishes roughest turned surfaces of 120 mu.-in. and higher to 4 mu. and lower in one pass at feed rates of 8 to 12 in. per minute.
- Finishes all machineable metals. Tools are made for all types of surfaces; internal and external, cylindrical...tapered, radial, flat.
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 performs sizing operations never before
 possible. Invaluable for bearing seats,
 oilite bushings, salvaging parts out of tolerance, etc.
- Run thousands of parts without tool wear.
 No stones to replace. Precision-hardened

- rolls last for thousands of parts. Tool maintains size setting. No adjustments necessary. Wearing parts replaceable. Simplest set up and operation. No skill required. Tool feeds and releases automatically.
- Off the shelf delivery of standard tools and replacement parts.
- Burnishing action rolls out tool marks... compacting and condensing the grain structure to form a long-wearing, workhardened surface.
- The top twenty companies in metalworking...plus more than a thousand other shops have replaced costly abrasive methods with Microller burnishing. Reports of 90% savings in production time and costs are common. Write for more information or send post-paid card in magazine.

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MADISON FAESSLER TOOL CO

P. O. BOX 1137, PROVIDENCE, R. I.

Report from Washington . . .

lines. It will lift wages 3% to $3\frac{1}{2}\%$ yearly; the other unions are not likely to win much more than this.

Productivity gains will offset much of the higher costs of wages in 1960. In the past, they have run about 3% a year.

Budget surpluses are now here. This fiscal year's will be small, but 1961's will be greater, regardless of what the Congress does. Federal deficits are a key inflation cause.

- A CUT-BACK IN AUTO ASSEMBLY FROM PLANNED SCHED-ULES seems increasingly necessary at this time. Production was planned at 2,278,500 units for this three months, up 42% from last year. But sales did not pick up as fast as had been hoped for. And dealer inventories are now ample. Such cut-backs aren't catastrophic. But they may be a sign that business is slowing down.
- RECORD RETAIL SALES VOLUME IS LIKELY THIS SPRING to judge from reports gathered at the country's wholesale markets. The number of buyers and volume of orders are hitting new highs. Upgrading of quality is fairly widespread in all lines and there seems to be very little balking at higher prices, possibly because of high incomes. Style is not a much bigger consideration than price. The late Easter this year—it comes three weeks later than in 1959—is important. It gives customers more time to get into a buying mood and it allows retailers to re-order hot items. Apparel, rugs, appliances, and sporting goods are going well. Good retail sales could go far to offset shortfalls in autos.
- WHEN WILL YOUR INCOME TAXES BE CUT, if not this year? Even the big surplus seen for fiscal 1961—beginning July 1—does not assure early relief. Some officials prefer to pay off part of the debt. Some others, in Congress, would rather spend it for more schools, highways, defense, etc. So cuts are out for 1961, too. The earliest date, then, for which rate reductions are considered likely is 1962. Corporations would probably share in the break.
- CONGRESS WILL CONSIDER TAX HELP FOR SMALL FIRMS during the session now under way. The idea is to allow deductions, up to 25% of earnings or a maximum of \$25,000 a year, for amounts plowed back into plant, machinery or inventory. The Treasury, at this time, is opposed to any action like this because of the revenue loss involved.

ARMSTRONG

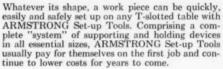
SET-UP and **HOLD-DOWN** TOOLS







ADJUSTABLE



Save Time: Keep costly machines and high priced men producing-save time otherwise lost while operators rummage in the scrap box for materials with which to devise makeshift set-up methods.

Prevent Breakage and Spoilage-correctly designed, machined from special steels or drop forged and heat treated, they are extremely stiff, strong and reliable.

Increase Accuracy-hold work rigidly and support it fully regardless of shape.

Prevent Accidents-end risk of set-up failure with resulting tool breakage, damage or personal injury.

Increase Profits - by reducing down time, increasing man hour output, assuring accuracy, ARMSTRONG Set-up and Hold-down Tools cut costs and build profits. They are part of every properly equipped tool room and shop.



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ARMSTRONG SLOT CLAMP



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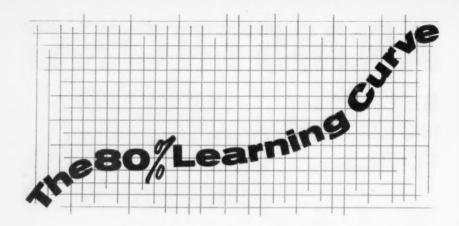


ARMSTRONG DOUBLE FINGER CLAMP

FINGER CLAMP

ARMSTRONO "U" CLAMP ARMSTRONG BROS. TOOL CO. ARMSTRONG AVE . CHICAGO

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The theory and application of this technique of establishing time standards, costs and other productivity factors are discussed.

By C. W. S. PARSONS Author of "Estimating Machining Costs"

In pricing subcontract work a producer on occasion makes trial runs in order to establish his costs. From these he arrives at selling prices to apply on current and follow-on contracts. Frequently, the purchaser goes along with that idea. Indeed, the manufacturer himself sometimes makes trial runs to establish measures of anticipated operations in this own shops.

Modern industrial engineering techniques do offer alternative methods of establishing standard times. There are published time measurements of the fundamental bodily motions. But in subcontract work, such methods may not be available. And a time study of a trial run is apt to be worse than useless.

Common sense indicates that there is such a thing as progressive improvement, especially when new work is first put in the shop. At first, performance is apt to be slower than normal. Results are often imperfect due to incomplete planning or preparation, or worker inexperience.

There is a learning process that has to be gone through. If productivity is not frozen at some specific level, as by the setting of a time standard, or the fixing of the speed of mechanical equipment, there is continuous improvement in output, though not at the same rate.

All of the agencies within a company contributing to production may be participating in this learning process. Product design affects what

"Shop management gradually irons out the attendant difficulties."

the shop must do, and may require simplification. Tool design influences production economy and may need revision. Equipment assignment, whether selection and purchase or design and construction, and so on, affect output and costs, and may require the repeated attention of manufacturing engineering, especially in the early stages, to bring production up to schedule.

Shop management, concentrating on specific problems, gradually irons out the attendant difficulties. Shop personnel, working on the new tasks, on production equipment or on assembly lines, gradually shake down and develop the required skills. These things all represent learning-process factors affecting the shape of the learning curve.

Early in World War II the 80% learning curve, so-called, was in fair-

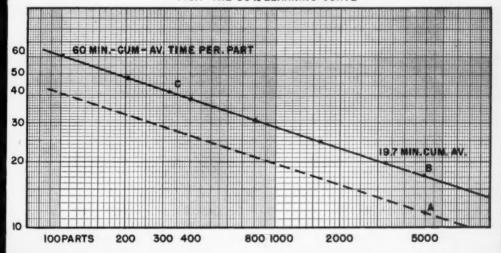
ly wide use in Pacific Coast aircraft manufacturing plants. One major application was in connection with the negotiation of prices on part or subassembly subcontracts.

Earliest applications dated back through the thirties. T. P. Wright of the Curtis-Wright Corporation, Buffalo, seems to have pioneered the use of the 80% learning curve, in estimating labor-hour work loads, in working up proposals for the manufacture of aircraft.

In recent years in some companies, engineers have experimented with learning curves other than "80% learning curve," but for most purposes the latter serves very well, certainly until the user becomes so adept with learning curves that he feels he must do some refining on his own hook.

According to the theory of the

FIG. 1-THE 80% LEARNING CURVE



80% learning curve, every time the total quantity produced, counting from the number 1 unit, is doubled, the "cumulative-average" time of the direct labor per unit of product (part or assembly) can be predicted by

multiplying by .80.

Take the case of machining 100 castings in a trial run. According to the 80% learning curve, if the average time per casting for those 100 castings turns out to be 60 minutes, then the predicted average time (cumulative) for the first 200, including the trial 100, would be $60 \times .80 = 48$ minutes. The cumulative-average time for the first 400 would be $48 \times .80 = 38.4 \text{ min}$. The cum-av time for the first 800 would be 30.7 min. The cum-ay time for the first 1600 would be 24.5 min. The cum-av time for the first 3200 would be 19.7 min., and so on.

The foregoing shows great predicted improvement during the early stages of operation. The factors influencing production may all be contributing heavily toward this end. At first the bugs to be worked out of the job are obvious and to a great extent easily dealt with. The worker's mastery of the operation improves steadily, especially if he is a skilled worker. As time goes on, successive improvements come harder. Increasingly, it takes more and more effort to push down the cost of labor per unit of product by smaller and smaller amounts.

According to the above figures, the first 100 castings would take (100 x 60)/60 = 100 hr. The second 100 castings would take [(200 x 48) - (100 x 60)]/60 = 60 hr. The last

1600 would take $[(3200 \times 19.7) - (1600 \times 24.5)]/60 = 397$ hr., or 24.8 hr. per 100 castings.

The improvement in the second over the first hundred is thus much greater than during the last 1600, per 100 castings. But such a statement may not be quite obvious. It is common to chart the data on log-log graph paper, as in Fig. 1, so that readings can be taken on any hun-

dred castings.

Once two or more values for a given chart or curve are established, as by doubling quantities, the learning curve can be drawn at once since such a log-log curve is a straight line. Then, taking Fig. 1 as an example, the cumulative averages, for the first 3100 and for the first 3200 castings, can be read direct. From that the time of the last 100 castings (3100th to 3200th) can be figured: [(3200 x 19.7) - (3100 x 19.9)]/60 = 22.4 hr.

Note the dotted line below and parallel to the solid line on the chart, Fig. 1. For any point on the solid line, except in the case of the first ten castings (about), the point on the dotted line directly below it gives the time value of the given unit of product, which in the case of the 80% learning curve can be figured by multiplying the cumulative-average value by .678. For example, with a cum-av value of 19.7 min. for 3200 castings, counting from number 1, the time to machining the 3200th casting would be about 19.7 x .678 = 13.4 min. By inspection of Fig. 1, the approximate average for the 100 castings from 3100 to 3200 is about (13.5 + 13.4)/2 = 13.45, and the

time for the last 100 castings (3100 to 3200) would be about (100 x 13.45)/60 = 22.4 hr., which is the same as indicated above in the calculation from cum-av values read off the chart

Say a manufacturer has a time standard for a part (representing quantity production), and wishes to place a trial order with a subcontractor for a 100-casting lot (small quantity). He can arrive at a fair estimate by going back up the learning curve from the point corresponding to the time standard. Suppose that industrial engineering says that the time standard corresponds to the actual time of the 5.000th casting—by then the operator must have reached normal skillful performance on the job, and the time standard is presumed to have been set accordingly.

To determine the position of the learning curve on a piece of log-log chart paper, a rough table may be set up as shown below.

When the learning curve is yet to be drawn, by calculating several points as above and plotting a straight line from them on log-log paper, it then becomes possible to go back up the curve from the point corresponding to a mass-production time standard to the point on the

cum-ay line corresponding to an initial (trial) run of 100 parts—in this case a 60-min, cum-av value.

If a manufacturer allows the subcontractor the liberal price matching a short run, as determined above by learning curve, he will be in a much stronger position to negotiate a lower price on quantity orders following a small-quantity trial run.

During the war years the aircraft industry regularly secured prices on follow-on orders that represented progressively going on down the learning curve. The main exception had to be made when orders (and production) were intermittent. Since time then elapsed between runs. some adjustment was in order to reflect loss of skill or organization during the intervals. This was a matter of negotiation.

The learning curve should be viewed as furnishing a reasonable output target. The learning process is real but not necessarily mathematically exact or consistent. The results depend in part upon its acceptance and upon intelligent effort to improve the job. Experience shows that the learning process is a satisfactory tool of production management except when time standards or machine speeds rigidly fix the rate of output.

Time standard, 11.5 min. per casting

(this matches time of 5,000th part on Fig. 1). (Marked "A", Fig. 1). Cum-av time for 5,000 castings, $11.5/.678 = 17.0 \,\mathrm{min}$.

> (by reverse calculation to go from dotted line back up to cum-av curve). (Marked "B", Fig. 1).

Cum-av time for 2,500 castings, $17.0/.80 \pm 21.25$

Cum-av time for 1,250 castings, 21.25/.80 = 26.56

625 castings, 26.56/.80 = 33.2Cum-av time for

313 castings, $33.2/.80 \pm 41.5$ (Marked "C", Fig. 1). Cum-av time for



Specially selected lubricants assure fine finish and extremely close tolerances in performing a wide range of operations on a variety of metals.

By IRA S. ROBERTS

Beneath the eye-catching exterior of the modern coinoperated record player—familiarly known as the "juke box"—are hundreds of small precision-made parts, fashioned of more than 30 different types of alloys, carbon steels, brasses and other metals. Precisely assembled, these many parts operate the mechanical marvel which provides popular music for young—and old—America.

At its Grand Rapids, Michigan, factory, Automatic Music, Inc., pioneer and leader in the field, not only assembles, but also fabricates all but a fraction of its production. AMI, an affiliate of Automatic Canteen Company of America, markets 100, 120 and 200-play machines equipped with either monaural or high-fidelity stereophonic sound systems.

More than 400 pieces of machinery, many of them doing fine precision work, must be kept in perfect working order for AMI to maintain its production schedules. AMI manufactures almost all of its own juke box components, including various colored cabinets trimmed in chrome and/or extruded anodized aluminum.

Key components include a selector unit, sound system, motors, record player, and transfer assembly. All must be equipped with fine-finished parts machined to tolerances which are sometimes as close as 0.0005 inch. No effort is spared to achieve these finishes and tolerances. Dan Van-Heteren, AMI's Machine Repair Supervisor, constantly circulates through the factory listening to the steady hum of the machinery. He keeps a card system listing the

lubrication requirements of every one of the 400 machines.

Three years ago he and John Kroon, Chief Plant Engineer, drew up a complete lubrication schedule for the machinery after consultation with Gulf Oil Corporation lubrication engineers. As a result of that survey, the lubricants previously kept in stock were reduced from more than 30 to a basic six.

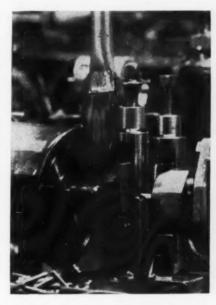
An example of precision parts for juke boxes is a special pin which is essential in controlling coin acceptance. It must be sensitive enough to accept nickels, dimes, quarters and half dollars as well as a host of foreign coins in AMI's widespread export markets . . . and to reject slugs wherever used.

Seven operations are involved in machining these parts on two Bardons & Oliver turret lathes. To obtain the different speeds required, it was necessary to augment these lathes with extra gear boxes.

Machinist Harry Ames has been operating one of these machines for fifteen years. The cutting oil used on this and on other tough cutting jobs in the AMI plant is a sulfo-chlorinated lard oil, Gulfcut 41C, specially formulated to provide good finish, accurate tolerances and longer tool life at low temperatures in this high-speed work.

Machinist Ames reports that on the average he grinds the high-speed steel tool only once a shift. Breakdown has virtually ended since the company started using Gulfcut 41C as the cutting oil, and the lathe has not required an overhaul for eight years. The lathe's production has increased commensurately with the end of downtime and higher speeds obtained.

Gulfcut 41C is used in 14 turret lathes, more than fifty small drill presses and in all screw machines. In one of these automatic screw machines, a Browne & Sharpe, the cutting oil normally is changed only four times a year. An efficient filter on the machine keeps the oil clean. This screw machine is used in the production of a silicon steel stud that



Hundreds of fine-finished, precision-made parts, fashioned of more than 30 different types of steel alloys, brasses, and so on, must be fitted together to work commercial automatic music machines—"juke boxes."

Here, a Bardons & Oliver turret lathe performs a total of seven operations in cutting a phosphor bronze part, which must have a 16 micro-inch finish in the blind hole.

"A complete wheel is machined in two minutes."

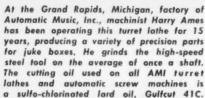
holds small nylon gears which drive the automatic juke box changer. A complete part is machined every 13 seconds at a spindle speed of 2,620 r.p.m.

Another critical component is the aluminum selector wheel, made to hold 200 pins, or one pin for each musical selection offered. This is produced on a Warner & Swasey Electro-Cycle No. 3 and the operations involved are chamfering, boring, reaming, grooving, turning and

burring. A complete wheel is machined in two minutes. Carbide-tipped tools are used on this machine and these, in combination with high speed production, produce considerable heat. To carry the heat completely away from the tool edge, Gulfcut soluble oil in a 1:50 emulsion is the coolant used.

AMI makes its own printed circuits, among other unusual manufacturing operations. An eyelet machine is used to apply connectors to inter-







An important component of a juke box is the aluminum selector wheel, which will hold 200 pins, or one pin for each side of 100 records. To assure proper spinning and selection, wheel must be kept to low tolerances, within 0.004 inch. Plant officials of Automatic Music, Inc., report that use of Gulf-cut soluble oil as the coolant has brought about long tool life in this operation.

connect circuits on the silver-plated copper-clad phenolic sheets.

In air compressors, hydraulic systems and other general-purpose applications, Gulf Harmony oils are utilized for their rust-preventive properties and excellent oiliness. The general-purpose gear lubricant is Gulf E. P. Lubricant, formulated for high film strength to insure longer gear life. AMI also uses considerable quantities of lithium-base Gulfcrown Grease, effective over a wide range of temperatures and strongly resistant to washing action in plain and antifriction bearings.

A strong believer in preventive maintenance, Mr. VanHeteren, prefers to detect any machine trouble before it can seriously affect production. There is some unavoidable downtime, but Mr. VanHeteren says that the character of the downtime has changed since Gulf's engineers helped launch his maintenance program.

"Now downtime on a machine rarely runs more than a few minutes," he says. "It used to be a couple of days, while the entire machine was rebuilt. If a belt gives out, you can't avoid downtime. But our downtime has been cut by more than 50 percent. We've been able to stock up on spare parts with the money saved—belts of many different sizes, for instance. We're getting higher speeds and saving on tool wear, too. Oil isn't expensive; downtime is."

Mr. VanHeteren records oil temperatures and also takes oil samples for study and analysis. With two assistants and a lubrication man he keeps all 400 machines in operation, often 16 hours a day, five days a week. He estimates total savings well



Aluminum selector wheel for juke box is completely machined in two minutes at a speed of 208 r.p.m. Operations involved are chamfering, boring, reaming, grooving, turning, and burring. To carry heat away from the carbide-tipped tool edge, Gulfcut soluble oil in a 1:50 emulsion is coolant used.

upwards of \$10,000 annually have been effected since the lubrication survey.

AMI has been in business more than fifty years. In 1927, it made America's first selective automatic phonograph. Three years ago, AMI pioneered the first hi-fi juke box making use of exponential horns as in the most costly home phonographs, and last year came out with the first three-channel stereophonic electrical selection machine. New models are brought out each year, like cars, so considerable retooling is necessary. AMI also manufactures allied equipment, push-button remote control units, and a full line of speakers.

HOW TO DESIGN

Jigs and Fixtures for

Suggestions are given for maintaining limited production jig and fixture expense at a minimum.

BY HAROLD SEDLIK

A survey of today's industry would reveal that a great many plants in this country are engaged in short-run production work. Short-run production can be defined as produc-

DRILL PRESS TABLE

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Fig. 1—Simple-to-devise drill press setup designed to eliminate cost of a drill jig.

tion where quantities are so limited that it is economically impractical to design and fabricate elaborate tooling. Consequently, to manufacture goods of limited production, jig and fixture expense must be held to a minimum. Careful consideration must be given as to the amount of investment justified in proportion to the quantity of production. Frequently this can be determined on the basis of past experience. However, some of the important advantages which special fixtures offer and which should not be overlooked even where low production is involved are improved interchangeability and increased accuracy of the parts which are produced.

The design of jigs and fixtures for limited production items differs considerably from tools producing similar items on a mass production basis. Frequently, to reduce tooling expense many of the basic fundamental principles of tool design cannot be observed. It is the tool designer's responsibility to reduce as much as possible the cost of tooling. This can generally be accomplished through careful planning and avoiding costly complicated jigs and fixtures. We

Short-Run Production

must remember it is possible to reduce labor expense through investing in tooling. On the other hand, a saving in tooling will invariably result in greater labor cost. The tool designer must compromise and apply as much ingenuity and skill as possible to insure the most suitable tools for the least investment.

To avoid unnecessary jigs and fixtures, standard equipment should be utilized whenever economically feasible. There are many cases, for example, where the standard machine vise, when equipped with special jaws, will serve as a satisfactory work-holding fixture. The wide utility of a vise has frequently been overlooked as the basis of a jig or fixture.

Special ingenious setups on standard available equipment can result in a considerable saving. For example, Fig. 1 shows a simple drill press setup designed to eliminate the cost of a drill jig.

When jigs and fixtures must be designed and fabricated, there are certain basic economic tool design principles which limited production warrants. First, wear will seldom create a problem; therefore, heat treatment of wear surfaces is usually not required. Mild steel can generally be used throughout a jig or fixture.

The design of a low production jig or fixture must be simple and require a minimum of machining. Avoid

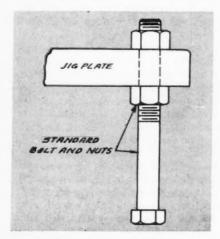


Fig. 2—Economical leg support design suggested for a short-run production drill jig.

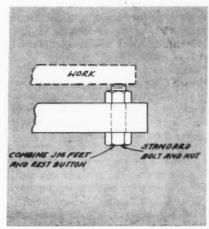


Fig. 3—In this design, a standard nut and bolt act as jig foot and work rest button.

"... the cost of a jig or fixture increases proportionately to the degree of accuracy required."

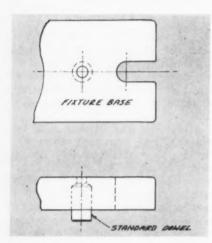


Fig. 4—Economical method for providing a short-run production fixture with base key.

finishing surfaces having no relation to the accuracy of the fixture. Do not counterbore for fillister or socket head cap screws, unless necessary. Utilize standard jig and fixture component parts when possible.

Jigs and fixtures should be designed with the possibility of modification to permit grouping of similar operations and items. A careful study of like items and operations can result in the complete elimination of equivalent tools.

Figure 2 shows an economical leg support design for a short-run drill jig. The design utilizes a standard bolt fitted through a drilled hole in the jig plate and equipped with standard nuts.

For maximum economy, two or more design features should be combined in a jig. Referring to Fig. 3, the design illustrated therein incorporates a standard nut and bolt which act as both a jig foot and work rest button.

Figure 4, presented on this page, shows an economical and practical method for providing a short-run fixture with a key. With this design, a standard dowel (diameter to suit keyway or T-slot of machine table) is simply press fitted into the fixture base

An important factor we should bear in mind is that the cost of a jig or fixture increases proportionately to the degree of accuracy required. The tolerance of a jig or fixture is generally established according to the accuracy of the operation it is to perform. Nevertheless, it is feasible to build a jig or fixture that would not require a great degree of accuracy and yet would produce satisfactory results.

At A in Fig. 5 is shown a drill jig in which the work is located in relation to the drill bushing by three dowels. Consequently, the relationship or location of the dowels to the drill bushing must, of necessity, be accurate.

The sketch *B* in Fig. 5 shows a jig which will produce the same results as the jig shown at *A*; however, with the jig shown at *B*, it is not necessary to locate the drill bushing accurately as the three screw stops are adjusted to suit. Once set, each adjustable stop should be sealed to prevent tampering. Jigs and fixtures designed with adjustable locators or stops are

"... the use of wood for jig and fixture construction is becoming increasingly popular . . ."

easy to build as accuracy is not required, but rather is induced at assembly through the adjustment of locators.

For short-run production, the use of wood for jig and fixture construction is becoming increasingly popular, as it is inherently free machining, light weight and inexpensive. Jigs and fixtures fabricated of wood must utilize steel locators, stops, and wear plates to minimize wear and maintain part orientation. Wood is advantageous for fixtures of large structure where steel cost is an

important factor. Jigs and fixtures constructed of wood are not normally recommended for use where close tolerances or heavy machining is anticipated.

The foregoing suggestions for minimizing tooling expense are but a few of many. The number of principles and applications are limited only by the ingenuity applied by tool designers in devising moneysaving ideas to the greatest possible advantage. These advantages should not be overlooked by any company engaged in limited-run production.

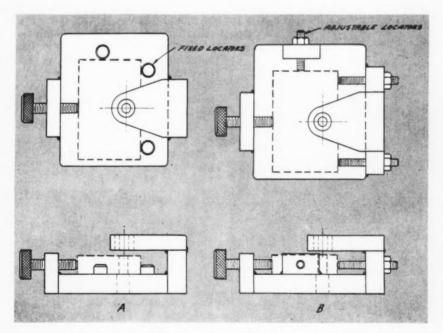


Fig. 5—Sketch (A) shows a drill jig in which the work is located in relation to the drill bushing by three dowels. Sketch (B) shows a

similar design of jig in which three screw stops are provided for accurately locating the work in relation to the drill bushing.



Producing Grease Retaining Rings

Stainless steel rings are machined inside and outside to close tolerances in a single 20-second cycle.

BY BARTLETT WEST

Full and complete meaning is given to the phrase "faster, better, and at less cost" when applied to operations now being performed on the new twin-spindle precision boring machine shown in Fig. 1, which was recently placed on the market by Jones and Lamson

Machine Company, Springfield, Vermont. Featuring unusual versatility of application, the new machine is designed for machining a wide variety of workpieces to a high degree of accuracy. One example, the workpiece illustrated in Fig. 2, a stainless steel grease retaining ring, is now being machined inside and outside to close tolerances in a single 20-second machining cycle.

Referring to the sketch Fig. 3, the workpiece is first held internally on an expanding mandrel located in the rear spindle. The OD is turned at the same time that the hole in the workpiece is bored and chamfered. Next.

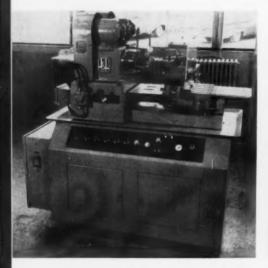


Fig. 1—View of a Jones & Lamson twinspindle precision boring machine tooled up to economically produce grease retaining rings.

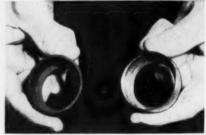


Fig. 2—Illustration showing actual grease retaining rings which were machined on the new J & L boring machine shown in Fig. 1.

the front edge is faced, followed by a form tool for cutting the required radius on the outside edge.

Upon completion of the operations on the rear spindle, the workpiece is transferred to the front spindle, where it is chucked on the OD in an air-operated step chuck. Three cutting tools on the cross-slide automatically bore the ID, face the inside surface, counterbore the ID and face off the front edge.

Excellent machining characteristics are achieved on this job through the use of DeVlieg Microbore units, the carbide tipped cartridge type tool bits which are exceptionally easy to adjust. Close tolerance is apparent from regular production checks of parts which reveal "7 micro" surface finish obtained on standard run of parts.

Providing versatility of control, the

CHAMFER SPINDLE FRONT SPINDLE

Fig. 3—Sketch showing the various surfaces on retaining rings that are machined in a 20-second cycle on the J & L machine.

J & L twin spindle precision boring machine can be operated either manually by means of pushbutton control or automatically. Operation of the cross slide for turning the grease retaining rings follows a square cycling pattern. However, when required for another part or parts "L" cycling may just as easily be utilized. Actually, on this machine tooling combinations can be either spindle or crossslide mounted, and can be quickly shifted for long or short runs. Due to the simplified operation of the J & L twin spindle boring machine no special skill is required on the part of the operator.

* modern machine shop *

ASTE Collected Papers. The 40,000 member American Society of Tool Engineers has announced the publication of Book II, Volume 59 of the ASTE Collected Papers. Book II contains all the technical papers given at the Society's recently Semiannual Meeting held in St. Louis.

Included in the bound library edition are articles on product engineering, fabricating processes, manufacturing planning and control, tooling design, metal working principles, metal forming, engineering materials, quality control, manufacturing management and four papers of general interest. All were carefully chosen by the Society for their content and value to the profession of tool and manufacturing engineering.

Copies of Book II may be obtained from the American Society of Tool Engineers, 10700 Puritan Avenue, Detroit 38, Mich., at a price of \$5.00 each to ASTE members and a price of \$10.00 each to non-members.

LET AN AUTHORITY TELL YOU



How to Solve Your Supervisory Problems

By ALFRED M. COOPER
Contributing Editor, Modern Machine Shop

In 1960 we Americans once more will witness a series of heated political campaigns, after which we will elect a new President of the United States, a new Vice President, a new House of Representatives, quite a few Senators, as well as a galaxy of state, county, and municipal officials.

After the tumult and the shouting dies, roughly half of us will feel happy at the way the elections went, and certain that, as a result, only years of prosperity stretch ahead. The rest of us probably will feel that 1960 marked the beginning of an era in which our country, and perhaps the world, began its trip to the eternal bow-wows.

Since the ambient political atmosphere and industrial prosperity are so closely intertwined, there is reason why employees and head men in industry should either "point with pride" or "view with alarm" when discussing outcome of the various campaigns. The difficulty is in guess-

ing correctly which candidates, if elected, will have the best long-range effect on industrial prosperity. Also, so long as proper checks and balances are maintained, the result of any election campaign may have far less effect on our future prosperity than candidate speeches would lead us to believe.

As voters, we are often too close to the picture, and too much influenced by political press-agentry, to evaluate properly the worth of any candidate, or the manner in which he will function after he has been elected.

Also, we sometimes fail to appreciate that this nation of ours is an industrial republic, and the most highly developed industrial republic on earth. When we forget this fact, or listen too closely to the beating of the political drums, we may lose sight of the truism that no politician or political party can do much to enhance our industrial prestige or detract from it.

In reality, the future of our coun-

For answers to your perplexing managerial problems address your letters to: Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio. try rests in the hands of our industrial leadership, our executives and supervisors, and our industrial workers. These are the people who will determine our destiny, rather than the success or failure of any candidate at the polls.

This does not mean that we should eschew strong partisan prejudices, any more than we should maintain absolute neutrality at a heavyweight championship fight or big bowl football game. It does mean that this nation will continue to prosper, regardless of who wins an election, so long as industrial executives and workers continue to think straight.

Regardless of which way elections turn out, the imperative thing is that we pull together toward a clearly recognized national objective, best stated by Lincoln at Gettysburg: that government of the people, by the people, and for the people, shall not perish from the earth. This advice, propounded by Lincoln nearly 100 years ago, has deeper significance when pondered along with the considered opinion of Benjamin Franklin, written nearly 200 years ago, that he believed this republic would endure for 200 years.

So long as American industrial leaders and workers keep those two admonitions in mind no political leader can possibly upset our national applecart. All elected and appointed public officials, and all governmental bureau heads, are and must continue to remain servants of the people. Any other situation spells demagoguery, dictatorship, and the consequent end of our American way of life.

It is perhaps excusable for any newly elected official to feel, at first, that he has been accorded a "mandate from the people." Thereafter he comes to appreciate that about as many of his constituents were voting against his opponent as for him, and these do not necessarily approve of his avowed political views at all.

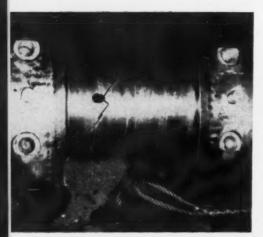
Under private enterprise American industry will continue to maintain world leadership. Within a "welfare state" private enterprise must give way to socialization of our industries. There is no instance in world history in which socialization has proved superior, as a method of getting things done, to our American way of life.

Therefore, it is true today, as never before, that industrial management must furnish the inspired leadership for the country during the very critical decade of the 1960s.



"Son, you start by putting in this afternoon with Chalmers and learn everything he knows. Then, tomorrow morning . . ."

Repairing a Broken



Step 1—Close-up view of the broken section of the huge ammonia compressor crankshaft.

By G. M. HOPKINS

Maintenance Superintendent

Recently, an unusual repair job was completed in the Machine Shop at the Jayhawk Works near Pittsburg, Kansas. It was unusual in the sense that perhaps not over a half-dozen of the largest machine shops would have attempted repair of a Clark compressor crankshaft.

Four crankshafts in the ammonia compressors have broken at Jayhawk during the last ten years. The first crankshaft broke in 1949; another crankshaft broke in 1958; and two crankshafts failed this past summer. A cost study revealed that a tidy sum of money could be saved if the repairs could be handled on the plant site.



Step 2—Section of broken shaft is cut out with a torch by operator in Welding Shop.

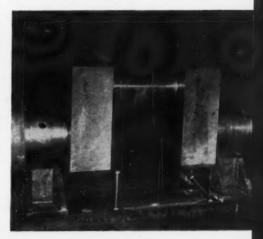


Step 3—Crank pin is finish machined in the Machine Shop using a shop-designed tool.

Compressor Crankshaft

For the first step in the repair job, the Technical Department determined the physical and chemical characteristics of the metal so that the replacement would be similar to the steel already in the shaft. Then the raw billet of steel was purchased and work was begun.

The illustrations herewith show the various steps taken in the repair of the crankshaft which weighs six tons. This is the second shaft to be repaired at Javhawk in this manner and the work was accomplished in 250 manhours. A new shaft would have required six to eight months for delivery. Doing the work on the plant site kept production on the line and cost the user only 15 percent of the purchase price of a new crankshaft.



Step 6-View shows the completed assembly of the repaired crank to the crankshaft.



Step 4—Crank piece is heated to a temperature of 525 deg. F. to effect a shrink fit.



Step 5-Preparations are made to assemble the fully repaired crank to the crankshaft.

Machining Stainless Steel

Modified drill grind solves oversize hole problem in machining 5/8-inch bushings from Type 440 F stainless steel rounds.

By G. J. STEVENS
Machining Engineer, Armco Steel Corporation

Problem:

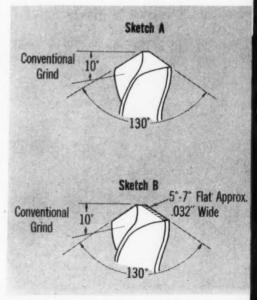
A screw machine shop was making a ½-inch bushing from Type 440 F stainless steel rounds in a Brown and Sharpe automatic. Operations consisted of a center drill, drill and cutoff at 80 feet per minute operating speed. The bushing was 2½ inches long and was drilled with a 5/16-inch outside diameter drill for the entire length.

A double margin type drill was used and, while a 0.002-inch concentricity was held without any particular difficulty, the holes that were produced were consistently 0.005 inch oversize

Solution:

Various type drill grinds were tried until a drill grind was found that overcame the trouble. Two B & S machines were involved, and the modified drill grind performed well on each machine. Sketch A shows the conventional grind that caused the

trouble, and sketch B shows in detail the successful modified grind.



Drawing showing how drill was modified for accurate drilling of stainless bushings.

HAVING **BORE SIZING PROBLEMS**

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previous operations with a minimum of stock removal. Corrects out-of-round, chatter, waviness, bow, taper, barrel, bellmouth. Guarantees bore

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From stock removal through finish sizing - from deburring through micro-fitting, Sunnen Honing is the most economical solution for internal work. No fixtures or time consuming set-up required; no

Range .100" through 2.625" with stock tooling -

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and through 41/2" with tooling built on order. INVESTIGATE

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as fine as desired.

the advantages of this fast stock removal process. Ask us for a copy of Bulletin SP-11 or an equipment demonstration in your shop. No obligation is involved.



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Average cost with tooling about \$1000



8880



TAILPIPES by the HUNDREDS

Typical tailpipe warehouse for auto-parts distributors is a tangled jungle of pipes of as many as 750 different models. In addition to the extensive floor space requirement for warehousing such a large number of tailpipes, considerable time is required to locate the exact model number required to fill an order. Distributors using the new Bend-O-Matic will need to stock only four basic sizes of straight tubing to tailor pipe to fit any requirements.

Numerical control system automates new pipe bender on which some 750 separate and distinct types of tailpipes can be produced automatically.

An automatic tailpipe bender that runs by the numbers and is slated for application in the electrical, petroleum, and furniture industries is now available from Nu-Era Corporation, Rochester, Michigan. Chief benefits offered by the machine—called the Bend-O-Matic—are in inventory reduction, floor space savings, labor reduction, elimination of an obsolescence problem, reduced material costs, and coverage of a broad range of tailpipe models which presently numbers about 750 separate and distinct types.

The General Machinery Division of Baldwin-Lima-Hamilton Corpora-

tion developed the new machine for Nu-Era and General Electric Company's Specialty Control Department, Waynesboro, Va., designed and built the special electronic control system that is used to automate the Bend-O-Matic.

To handle the complex job of bending straight tubing into tailpipes to fit virtually any automobile or truck, General Electric adapted its precise, point-to-point numerical positioning control to this first application of a metal-forming process.

Heart of the system is a small—one inch in width, generally about 18 inches in length—programmed paper tape which feeds through an integral

tape reader to direct automatic operation of the machine. Three motions and 13 auxiliary functions can be

programmed.

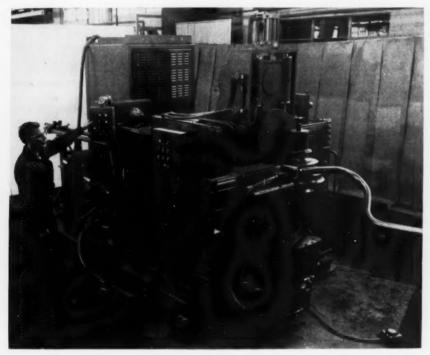
Operation of the machine is completely automatic except for loading and unloading. To run a tailpipe, an operator selects the proper tape, inserts it into the tape reader, selects the proper diameter of straight tubing, places it into the machine, presses a button, and removes the bent-to-order tailpipe after the machine has completed production.

Actual operating time amounts to about two minutes with the machine making precise bends at a rate of six per minute. Controlled motions include carriage feed, polar rotation of the pipe, and the bend angle.

The three chief functions of the machine are to move, position, and bend pipe; move, position, and flatten pipe; and move, position, and cut off

nine

In order to reduce stocking problems for the distributor, 16-foot lengths of straight tubing are generally used—although the Bend-O-Matic will accept tubing up to 36 feet in length. Since each tailpipe is eight feet or less in length, this means that two pipes can be made from each length of tubing. The automatic cutoff operation is programmed to saw the pipe in half following completion



Bent pipe is shown at exit end of Bend-O-Matic. Note die around which pipe is bent.

Tailpipes by Hundreds . . .

of bending and flattening operation.

With the Bend-O-Matic, straight tubing of the proper wall thickness and diameter—only four basic sizes are required to cover the entire range of existing models—is manually placed into the machine. At this point, a preselected tape takes over to direct production of the desired tailpipe. Except for loading and unloading, the entire operation is automatic after the operator places the proper tape into the tape reader and pushes the "start" button. All necessary bends, flattening, and final cutoff are performed without supervision. Production can be quickly and easily shifted from one model to another merely by the insertion of a different tape into the tape reader.

Service School Features Steel Workbenches

One of the most famous service schools in the world is that conducted by Johnson Motors at Waukegan, Illinois. This school turns out over 1000 factory trained mechanics a year. To be eligible for this school pupil must either be a Johnson dealer, or an employee of the dealer, or a member of some branch

of Uncle Sam's service. People come from all over the world to attend this school. Classes are conducted by eight instructors. Steel workbenches, supplied by Lyon Metal Products, Inc., Aurora, Ill., are used at the school. The stability of these benches is evidenced by the fact that a 300-pound motor can be fastened to one side of the bench, as shown in the accompanying illustration.

For more data circle 1 on Postpaid Card



View shows how steel workbenches are used in supporting heavy motors while being serviced.

FORMICA SPECIFIES MORSE TOOLS



Morse Electrolized Tools proved best by test for tapping—drilling glass, fabric and paper—base materials.

Formica pulls no punches in its installation manual . . . they recommend Morse. Why? Because they proved Morse Electrolized Taps and Drills best by test for installing their material.

Prove to yourself what Formica and other manufacturers have found . . . the exclusive Morse *Electrolizing* Process gives up to 30% longer tool life on the toughest jobs—no matter what base materials are used, there is a Morse Tool designed to help you cut production costs . . . build a better product.

See your Morse-Franchised Distributor. He is the *only* man to see when you want the best in cutting tools. Call him *today*.

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4 <u>built-in</u> qualities make G-E MAN-MADE DIAMONDS better for you!

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General Electric Man-Made industrial diamonds are of uniform shape and structure within a given size range. This uniformity, assured by controlled manufacturing processes, results in performance which is consistently superior to that of nature's diamonds.

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wheel removed 928 cubic inches – a G-E superiority of 63%.

To enjoy the benefits of these 4 builtin qualities, specify General Electric Man-Made diamonds (Type RVG) for all resinoid and vitrified grinding wheels. Metallurgical Products Department of General Electric Company, 11109 E. 8 Mile Road, Detroit 32, Mich.



General Electric industrial diamonds are more friable than natural diamonds. This means you get sharp new cutting surfaces throughout the grinding process. And G-E has optimized the friability of RVG diamonds to cover wider applications, heavy downfeeds.

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March, 1960

MODERN MACHINE SHOP

133



CALCULATED TO CUT COSTS

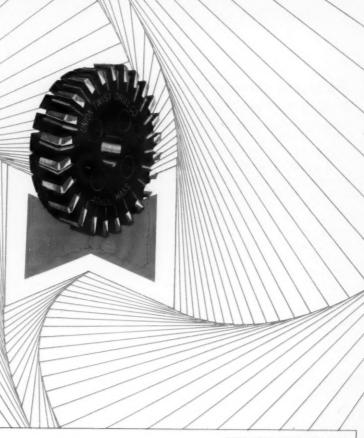
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Machine Tool

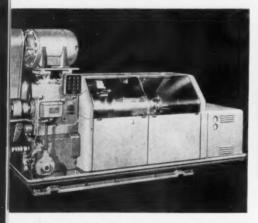
Jones and Lamson announces the Profitivity Lease Plan®, a one-package plan for leasing standard and special tooling and perishable tools.

A prediction that the metal working industry will turn to leasing machine tools on a mass scale to solve its problems was made in a speech given at the Savoy Hilton Hotel, New York City, by Holmes H. Whitmore, Executive Vice President of Jones & Lamson Machine Company, Springfield, Vermont. The prediction was based on a six-month study just completed by the company on existing leasing plans versus installment or cash purchases.

The analysis resulted in a decision to provide a unique, one-package

lease plan announced by Jones & Lamson for not only its own products but encompassing other machinery required by metal working companies to replace obsolete equipment or expand production facilities.

The lease plan, explained by Norman T. Harrison, Jones & Lamson Treasurer, and Howard A. Finch, Manager of Marketing, is unique in that, at bank rates, it requires no down payment, no security deposit, no monthly payment until thirty days after shipment, and includes standard and special tooling and



Fay 16-Inch Automatic Lathe available under the new Profitivity Lease Plan of Jones and Lamson Machine Co., Springfield, Vermont.



Jones and Lamson's E-2 Form Grinder, with completely automatic cycle, now available under the company's new lease plan.

Leasing Plan

perishable tools. Since no capital outlay is required, tools will be paid for, in effect, out of profits derived from their use in current production.

Mr. Whitmore listed the major problems faced by metal working

manufacturers as:

Critical shortages of after-tax capital in the metal working industry.

Obsolete machine tool equipment. The squeeze on the metal working industry caused by higher labor and raw material costs.

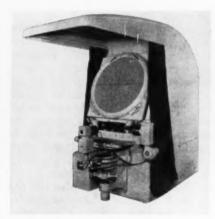
Need for new, more efficient machinery to step up production to offset the upcoming shortages of skilled labor.

Infiltration of foreign-made machines into domestic markets.

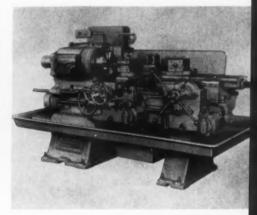
Federal tax laws now impeding investment in modern equipment—especially outmoded restrictions on rates of depreciation and tax life of equipment for amortization.

"It is our conviction that true leasing will considerably ease these problems," Mr. Whitmore stated. "There is a huge 'backlog' of obsolete machine tool equipment. Forty-five percent of all machine tools now in use was installed before 1945. This amounts to \$5 billion worth of equipment that should be immediately replaced.

"In addition, there is the basic fact that economic forces require all industrial firms to increase productivity. This must be done against



Another piece of equipment which can be Profitivity Leased is the Jones & Lamson FC-30 Optical Comparator with 30-inch screen.

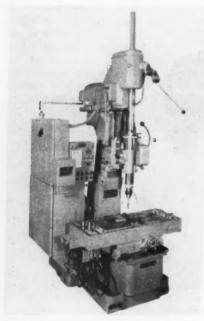


The Jones and Lamson line of turret lathes, one of which is illustrated herewith, is another Profitivity Lease Plan example.

"... plan will hasten necessary replacement."

constantly rising costs of raw materials and labor that place heavier and heavier demands on a critically low supply of working capital. With population increasing faster than skilled labor availability, producers can eliminate this squeeze only by installing more up-to-date equipment.

"This condition, along with new developments and processes, will cause more and more equipment to become obsolete more rapidly as the years go by. Providing new and better tools to increase output in the face of all these challenges is continual and costly to business. Compli-



A numerically controlled positioning table of the design shown here is also available under the new J&L Profitivity Lease Plan.

cated and intricate tools are expensive. Many small firms, for example, find it hard to make even a down payment."

The new leasing program is known as the Jones & Lamson Profitivity Lease Plan.® Many of the machine tool builder's customers have already indicated they will participate.

"Actually, this means that for many users of specialized tools, the purchase price is no longer significant," says Mr. Finch. "The tools are leased out of current income, and in all cases income will be substantially increased because of the higher productivity that is possible with new, modern equipment."

Under the Vermont firm's new leasing arrangement, the lessee commits himself to leasing one or more pieces of equipment for a specific period. Jones & Lamson will give him the same one-year guarantee of maintenance and repair that it gives buyers of its machinery.

The plan is expected to have particular attraction for smaller industrial companies. Such producers often find themselves at a competitive disadvantage when they try to accumulate sufficient capital to replace equipment or expand production. Jones & Lamson also believes the general desire to boost industrial productivity in the U. S. will spark a major urge to lease by many firms in the metal working business.

The Jones & Lamson plan will not in itself speed the obsolescence of metal working equipment, but company officials believe it will hasten necessary replacement.

Through its antecedent companies,

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It was written especially for Nicholson and draws upon all our experience with metalseparating jobs and tools.

Partial listing of topics discussed—"How to get the most out of hand hacksaw blades," "Power hacksaw tooth selector," "Hints on the use and care of power hacksaw blades," "Band saw blade and tooth selector," "Friction sawing," "Contour sawing."

Illustrated with numerous photographs, drawings and diagrams. Text is in easy-to-understand terms for everyone who deals with metal sawing.

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Files and Rotary Burs - Hacksaw and Band Saw Blades - Ground Flat Stock Industrial Hammers

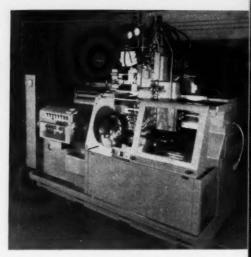
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Machine Leasing Plan . . .

Jones & Lamson has been a leader in machine tool craftsmanship since 1835. It first developed turret lathes, thread grinders and optical comparators. Among its present products, in addition to its originated equipment, are numerically-controlled machine tools, automatic lathes, automatic double-end milling and centering machines, tracing lathes and threading dies. In addition, it is said to be the largest producer of optical measuring equipment in the world.

Jones & Lamson also pioneered in mass production of interchangeable parts for machinery by providing such components for the hand-operated gear pumps that were the initial products of the original company.



This Jones and Lamson Model 30 Automatic Tracing Lathe can be Profitivity Leased under the Springfield, Vermont, firm's new plan.

Nature and Properties of Engineering Materials. By Zbigniew D. Jastrzebkski. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 571 pages. Illustrated. Cloth binding, board covers. Price, \$11.00.

This book approaches the fundamental nature of materials from an engineering viewpoint. It provides the reader with the basic knowledge necessary for intelligent selection and use of materials for specific engineering applications and prepares him to solve materials problems of the future. Furthermore, this approach offers a close link between the basic sciences of chemistry, physics and engineering practice.

The book begins with a consideration of the basic concepts of interatomic and intermolecular forces and their relationship to the structural characteristics of both crystalline and amorphous materials. This is followed by the discussion of such phenomena as diffusion, crystallization, phase transformation, and phase equilibria. These principles are further developed in the subsequent chapters which consider more specifically the characteristic properties and uses of a wide variety of engineering materials.

The author includes information which until now has been available only in specialized higher level reference works. Many concepts considered to have been the domain of graduate and specialized courses are presented here in a manner which should be quickly and easily understood by under-graduate students as well as by practicing engineers.

NEW, AUTOMATIC RECESSING TOOL

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ELIMINATES TOOL DEFLECTION, ASSURES CLOSE TOLERANCES, FINE FINISHES

- Solid, single-bar construction prevents cutters from chattering and keeps tool cutting accurately to depth, width and position. There is only one joint to effect tool accuracy... with a long supporting bearing surface.
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Depth and position of recess is adjusted through two calibrated adjustment nuts. Set up time is negligible. *Use Tool on Any Machine*... on any standard drill presses, milling machines, lathes, automatics, etc.

NEW, SNAP-ON ADAPTOR CONVERTS TOOL FOR PILOTING IN WORK!

The new Madison tool can pilot through a bushing in the work . . . or, by adding the adaptor, pilot in the work itself. The adaptor is used on work-turning machines such as lathes. Fixture bushings are normally employed on machines where the spindle is turning, as on drill presses.

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MEDIUM DUTY—For Self-Centering Scroll Chucks, Independent Chucks and Combination Scroll Chucks.

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These jaws can be used as supplied or shaped to meet specific requirements. Made from low carbon steel which can be easily carburized and hardened. Extra-high heavy duty top jaws are also available. The Long Pointed Jaws are designed so that points meet at center of work, permitting full use of chuck capacity.

SERRATED JAW TYPE and Master Keys





For Heavy Duty Power and Scroll Chucks These jaws also can be used as supplied or shaped to meet specific requirements. They are processed to resist rust and can be easily shaped, carburized and hardened. Screw is supplied when jaw and corresponding key are purchased together—permitting key and jaw to be stored assembled as a matched set.

Serrated Master Keys: Precision-machined from top quality, hardened steel. Serrations are so machined that by reversing master key 180°, the top jaw can be adjusted to ½ the pitch of the serrations. This feature permits easy adjustment of the top jaws in reference to the work.

HEAT TREATING INSTRUCTIONS INCLUDED WITH ALL BLANK JAWS

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■ Save up to 90% of replacement costs on machine repair jobs ■ Do your own hard-facing at high speed, low cost ■ Apply long-wearing, corrosion-resistant coatings

A real opportunity for the smaller shop. Thousands of large, well-known companies and shops have been metallizing users for many years, not only in maintenance work but in production applications on original equipment. Now, with modern low-cost metallizing equipment this high-speed "putting-on" tool is within the reach of even the smallest shop.

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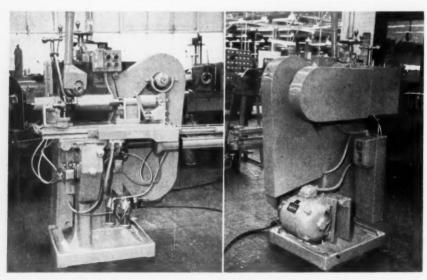
MURE PRODUCTION

Small Mill Cuts Costs in Piston Ring Production

The small milling machine has long been a vital factor in the high production of piston rings at the Perfect Circle Corporation, Hagerstown, Indiana. More than 25 years ago, Perfect Circle purchased its first No. 1 U. S. milling machine, recognizing the optimum economy pro-

vided by small mills for many production operations.

Recently, Perfect Circle again reaffirmed its confidence in these products of the U. S. Burke Machine Tool Division, Cincinnati, Ohio, by installing five new No. 1 U. S. mills equipped with air-hydraulic longitudinal table feed for modern production. The principal production use of each machine has been as a 3-inch



Front and rear views of small mill used at Perfect Circle for piston ring production.

THROUGH ERNIZHTION

diameter saw which automatically cuts or parts piston rings. These rings are arbored in multiples and clamped together to a length of 7½ inches. The processing takes place in Perfect Circle's Form Turn Department, where the piston rings are first turned out-of-round on lathes of Perfect Circle design. The No. 1 U. S. Mill then cuts the gap which, when closed, brings the ring to a perfect circle conformation.

To adapt the mill for the piston ring production and to accept the arbor, Perfect Circle adds its own design of horizontal movable saw spindle head, head and tailstock centers, and electrical circuits which afford the automatic cycles and safety desired. Prior to the purchase of the modern mill equipped with airhydraulic feed, the table was fed longitudinally by a barrel type cam.

With the simple set-up provided, the operator easily hand loads the arbor between the centers and secures it with an air clamp. The rest of the operation is completely automatic. Once the start button is pushed, the mill makes two complete cycles through the 7½-inch length of piston rings. One-half of each cycle is the cutting operation which takes

30 seconds. The remaining one-half cycles are rapid returns.

The machine is operated at a spindle speed of 600 r.p.m., with a carbide saw speed of 470 s.f.m. The metal involved is piston ring iron. Each mill purchased by Perfect Circle has a range of spindle speeds from 150 to 5000 r.p.m. Six alternative speed changes can be quickly made, since the drive is from the motor to countershaft, and countershaft to spindle, by means of B-section V-belt. The countershaft rides in precision ball bearing housings for trouble-free operation.

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* modern machine shop *

Grooved Hole Machining Aids High Pressure Designs

High heat exchanger pressures, already at 5,000 p.s.i. and expected to climb to 7,000 p.s.i. in the near future, have dictated new ways of joining heat exchanger tubing to flanges, housings and other solid structures. Latest technique is to employ grooved locating holes, into which may be swaged the heat exchanger tubes.

Machining a multiplicity of groov-

more production . . .

ed holes in heat exchanger tube sheets can easily require a high degree of special tooling and relatively low production rates. One manufacturer, Ross Heat Exchanger Company of Buffalo, has adopted a new tooling concept to solve this problem. Ross now employs a springloaded cutting tool, called the "Bak-Sink," which produces a groove in a hole automatically. This tool is manufactured by Cogsdill Tool Products, Inc., of Oak Park, Michigan.

Many of the tube sheets manufactured by Ross contain from 2,000 to 3,000 holes. The BakSink tool is mounted in a spindle of a programmed drilling machine which positions the tool in front of the hole to be grooved-machined. As the tool enters the hole during forward feed, the cutting blade of the BakSink remains inside a pilot arbor. When a ball bearing rotary collar on the tool seats against the work, further forward feed forces the cutter out of the pilot

arbor. On the reverse stroke, the blade re-enters the BakSink arbor so that it clears the work upon removal.

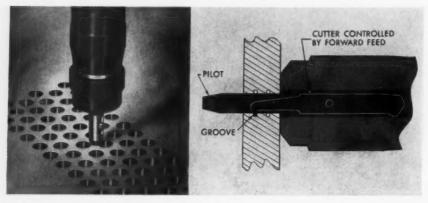
Grooving tool speeds used by Ross approximate reaming speeds for the same material and hole size. Feeds are not critical since an over-travel safety within the tool prevents increased depth of cut under excessive feed. Blades are altered to vary the cutting clearance for different materials. Blades can be changed in a few minutes without special tools. Thus, the same basic tool can cut a number of different grooves; and, by exchanging the pilot, Ross can use the same basic tool to groove holes over a wide diameter range.

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* modern machine shop

Tool Change Reduces Gear Machining Time

Until recently the machining of 103/4-inch diameter forged steel gear blanks in an Indiana plant took six hours during which 40



(Left) Spring-loaded cutting tool ("BakSink") used to automatically groove locating holes in heat exchanger tubes, (Right) Cross-section of grooving tool, showing design features.



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more production . . .

pounds of metal were removed in rough and finish turning the inside and outside diameters. As long as only a few parts were required the tooling was economical for Fairfield Mfg. Co., Lafayette, Indiana.

When an increase in production was required, the use of single-point tooling became too expensive and inefficient. Machining time was then cut to less than one hour by designing two catheads, each holding three tools, and by changing the type of tools to "throw-away" insert tools. Acting on the advice of a Kennametal field engineer, each head was fitted with three heavy-duty Kendex positive rake tools with Grade K21 triangular inserts. Two Style KTFR-85 tools are used for turning the main bore and one Style KTFL-85 tool for turning the hub.

The two heads are used for rough machining the inside diameter of the gear. Tools on the first cathead remove the bulk of the stock, each insert taking a full width of cut (¾ inch) at the bottom of the bore. Tools on the second cathead complete the roughing cut on the hub and step turn the main bore.

With this tooling 17 cuts are taken with each head before the inserts are indexed to new cutting edges. With three indexable cutting edges per insert, 52 cuts or 26 gears are completely rough machined per set of inserts. Total time per piece was reduced from six hours to an average of 54.8 minutes.

Workpieces are of SAE 4140H forged steel. They are machined on a Warner & Swasey No. 3A lathe, using a feed of 0.0124 inch per revo-

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more production . . .



Two catheads with Kendex throw-away insert tools cut machining time on forged steel gear blanks to less than one-sixth the time that was previously required for this job.

lution and 3/8 to 1/2-inch depth of cut. The first cut is made at 42 r.p.m. (105 s.f.m.) and the second cut at 77 r.p.m. (190 s.f.m.).

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Two Machine Team for Processing **Bearing Carriers**

Teamwork between a precision boring machine and internal grinder lets the Lycoming Division of Avco Corporation, Stratford, Connecticut, bore, face, chamfer and finish grind six bearing diameters in steel carrier assemblies at a rate of 7 parts per hour with 80 percent efficiency. Starting on a Heald Model 221 Bore-Matic, each bearing diameter is bored, counterbored, bottom faced and chamfered to a 0.0002-inch tolerance for size. Stock removal is 0.061 inch on diameter and 0.030 inch on face; finish is 63-125 microinches r.m.s.

Work is held in a hand-operated rotary indexing fixture, located by a



gest fitting, angular tubing joints for cheaper, quicker, easier induction welding or brazing.

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for various angles and sizes are interchangeable. Write FURNISHED

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CHANGE PITCH IN SECONDS WITHOUT CHANGING LEAD SCREW



VOLUME PRODUCTION WITH PRECISION. This Air-Operated, Automatic Lead Screw Tapping Attachment converts your drill press into an extremely accurate tapping machine capable of volume production.

*5.000 SMALL PARTS PER HOUR. Using the LEADSKRU-MATIC as the basic machine, one of our customers built a small parts tapping unit comprising table, hopper feeds, holding fixtures, controls, etc., which taps up to 5,000 nut blanks per hour . . . AUTOMATICALLY. And at a lower cost than less versatile tapping machinery!

SHORT OR LONG RUN VERSATILITY. Besides the deluxe, air-operated, adjustable pitch model shown at left, you have, according to your requirements, a choice of electrically driven, manually operated adjustable pitch tapping attachments, or conventional single pitch units. No need to pay for extra features or parts that your iobs do not require.

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- 1. Adjustable Pitch Change pitch in seconds without changing lead screw.
- 2. Exact thread depth control.
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- 4. Cannot break taps or rip threads.
- 5. 22 separate Pitch Adjustments with 2 models.
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- 10. Constant production with unskilled operators.
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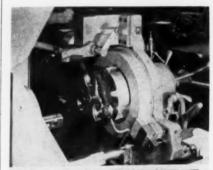
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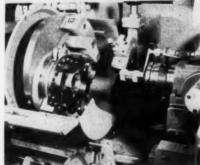
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more production . . .

center hole diameter and positioned radially by a pivoted plug which fits into one of the holes to be bored. Tooling is carried on a rotating crossfeed unit.

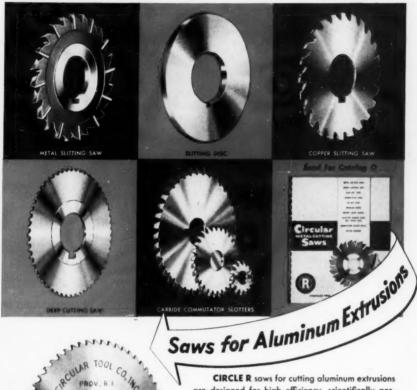
Both small I.D.'s are bored as the table moves left to an intermediate stop. The cross-feed unit operates to generate the rear face and chamfer the rear hole. Both large I.D.'s and the front hole chamfer are made after stop retracks and table continues left to positive stop. The cross-feed reverses to generate the face of the front hole and the table returns to





(Above) Setup for boring, counterboring, facing and chamfering bearing carrier. (Below) Setup for finish grinding carrier.

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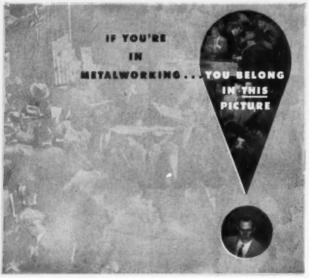
rest. Work is indexed 120 degrees and cycle repeats two additional times.

Work is then moved to a Heald Model 2712 internal grinder where the bearing diameters, bottom faces and adjacent radii are finished ground to tolerance of 0.0007 inch for size. The carrier is securely bolted to an adapter plate which is clamped in a three-position manually indexed fixture equipped with diaphragm type location and a removable hand locator.

The two-in-line bores separated only by flanges of small diameter are ground by means of a double wheel in a conventional ball-track Size-Matic cycle. Opposite holes in both

flanges are equally spaced within 0.0005 inch of true position and holes are round within 0.00025 inch T.I.R. Finish is said to be 32 microinches r.m.s.

The table goes into a positive stop, and both flanges are plunge ground to semi-finish size as the workhead cross slide feeds forward. The workhead cross slide retracts, the table runs out to dress both grinding wheels and the cycle repeats to grind to finish size. The work is indexed 120 degrees and the operation is repeated for the purpose of grinding the other four holes. For more data circle



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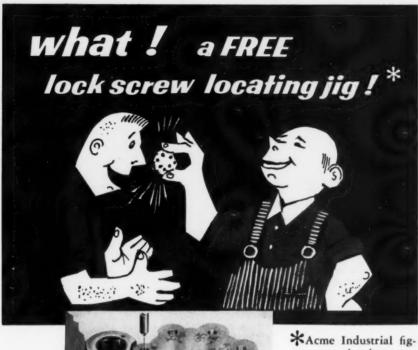
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more production . . .

Overhead Drill Press Solves Large Switchboard Panel Drilling Problem

The problem of drilling 150 to 200 holes in ebony asbestos and steel switchboard panels too large for the throat capacity of a conventional drill press (7 to 10 inches) was solved at Electric Box and Switchboard Company, Chicago, by the use of a standard Delta overhead drill press. Panels up to 40 by 72 inches



Overhead drill press setup used for drilling 150-200 holes in switchboard panels.



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used for: drilling, counterboring, spot facing, reaming, as well as prime movers for milling equipment. Multiple operations may also be performed.

For the full story on the cost-saving advantages get in touch with your local Ex-Cell-O Representative. Or, if you prefer, write direct to Ex-Cell-O, Detroit.

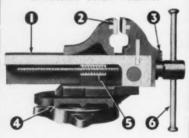
*Style 22-8-inch Strake; Style 22-L-12-inch Strake.

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Desmond Simplex

The Desmond-Stephan Mfg. Co. Urbana, Ohio

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more production . . .

are drilled with drills, hole cutters and fly cutters.

The tool can reach to any point within 10 inches of either side of the 40-inch track on which it is mounted. But, because there is no column to interfere with positioning, the work may be moved to give the drill press unlimited capacity. The table on which the work rests is mounted on casters in order to facilitate positioning of same.

Before installation of the Delta tool, panels were drilled with a column mounted machine which required constant turning of the workpiece and the use of special igs and fixtures.

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Ideas from readers Several time-saving ideas and sugges-

Several time-saving ideas and suggestions for the man in the machine shop.

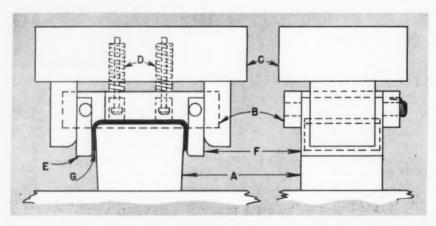
Die for Forming U-Shaped Parts

By C. McLAUGHLIN

Recently, we had a job which called for making a U-shaped part from aluminum. Considerable difficulty was experienced in producing the part because of the springback of the "U" after forming the part. In addition, the die scored the aluminum in forming same.

To solve these problems, we devised the die shown in the accom-

panying sketch. The design includes a die block, A, with slightly tapered sides; and an H-shaped punch section, B, which is mounted in the punch holder, C, by means of springloaded shoulder screws, D. Two pivoted members, E and F, are provided at opposite ends of the H-shaped section, B, as shown. The drawing shows the H-shaped section with the front side removed for clarity. The swinging members, E and F, have integral mounting pins to which springs are applied to swing the members to a horizontal position after



Sketch of die for accurately forming U-shaped aluminum parts without marring same.

each stroke of the die has been fully

completed.

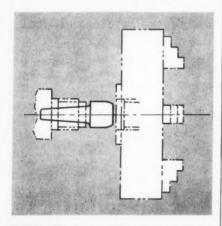
This design of die eliminated the problem of spring-back in the work-piece, G, by overbending the legs. It also reduced the possibility of scoring the part since the actual bending of the part is done by the two pivoted members, E and F, which roll the stock down to the desired shape without sliding on it.

* modern machine shop *

Spindle Plug Facilitates Mounting of Heavy Chucks

By F. MURRAY

Heavy chucks and faceplates are easier to mount on threaded nose spindles if a plug, fitting the tapered hole in the spindle as shown in the accompanying sketch, is used to support the chuck and keep it in line with the threads on the spindle. This eliminates the possibility of marring the threads as frequently occurs when the chuck is not proper-



Spindle plug for mounting of heavy chucks.

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MODERN MACHINE SHOP 163

ideas from readers . . .

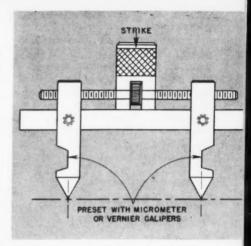
ly supported. The end of the plug should have a bullet nose and both the outside diameter and nose of the plug should be polished.

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Easy-to-Set Layout Punch

By HAROLD SEDLIK

The prick punch shown in the accompanying sketch is designed to provide a quick and easy means for laying out two holes to a highly accurate center distance. Using either a micrometer or vernier caliper at the locations indicated in the sketch, the punch can be readily preset to the desired center distance. Under favorable conditions, the writer has



Sketch of easy-to-set hole layout punch.

been able to readily obtain an accuracy of 0.002 inch with a layout punch of this particular design.

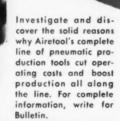


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Shims

The Laminated Shim Co., Inc., 3305 Union St., Glenbrook, Conn. Shim Design Folder No. 3 contains eight pages of up-to-date, well illustrated design information and specifications on custom-built laminated shims, made of Laminum. These are solid shims that "peel" for adjustment.

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Boring Bars

Wesson Co., 1220 Woodward Heights Boulevard, Ferndale 20, Mich. An eight page, illustrated booklet, Bulletin B-1259, describes all available standard boring bars, including micro-adjustable interchangeable head, micro-adjustable and non-adjustable types. All bars use square or triangular throw away carbide inserts. Complete engineering and specification data is included on the five different styles of bars. For more data circle 8 on Postpaid Card

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Edroy Products Co., Department P, 480 Lexington Ave., New York 17, N. Y. Six page folder on the Magni-Focuser. The value and diversified use of the Magni-Focuser is shown by 20 photos made "on the job" in many industrial plants. The Magni-Focuser shows work in the third dimension, greatly magnified. It insures greater accuracy by relieving eyestrain. For more data circle 9 on Postpaid Card

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Acro Metal Stamping Co., 330C East Reservoir Ave., Milwaukee, Wis. Bulletin TP59 includes information on Acroflex, drill rod racks, leader pin oilers and wing nuts.

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Parts Marking Machine

The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Bulletin No. 111 contains six pages of data on Acromark Parts Marking Machines. It is complete with price list and details.
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Heat Treating Furnaces

Electra Products Co., Montgomeryville, Pa. Flyer presents the Series H and D Furnaces of unitized construction. Select one, two or three furnaces in one compact unit; each is independently controlled; high temperatures—2,000, 2,300 or 2,500; low temperatures-800, 1,250 or

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Abrasive Cut-Off Machine

A. P. deSanno and Son, Inc., Phoenixville, Pa. This color bulletin illustrates and describes the Radiac Type "N16-FA" Fully Automatic Abrasive Cut-Off Machine designed for fast, accurate production cutting of solids up to 1 inch in diameter.

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Drilling and Tapping Heads

The Jarvis Corp., 101 Washington Park, North Attleboro, Mass. Literature describes the company's latest addition to its line of multiple drilling and tapping heads. Brochure fully illustrates and points out the advantages of a new type universal joint multiple head. This head offers the flexibility that is expected of a universal joint type attachment, coupled with extreme rigidity through the use of special materials and advanced structural design.

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Air Tools

Newage Industries, Inc., 222 York Road, Jenkintown 19, Pa. Catalog contains specs and features of silent compact Power Atom screwdrivers, corner screwdrivers, nutrunners, miniature screwdrivers, wrenches, tappers, grinders and accessories. Also included are price sheets for tools and accessories, pages containing detail technical data and dimensions and photos of the tools. For more data circle 15 on Postpaid Card

Hold-down Clamps

Adjustable Clamp Co., 436 North Ashland, Chicago 22, Ill. Bulletin on Jorgensen Hold-down Clamps, Style No. 16. These clamps mount securely on the surface of any bench, machine table or sawhorse. Various applications are illustrated and described. For more data circle 16 on Postpaid Card

Tapered End Mills

Wolverine Cutter Co., 1066 Butterworth St., Grand Rapids, Mich. Catalog on Wolverine Tapered End Mills, designed for service, precision and economy, For more data circle 17 on Postpaid Card

Vibration Interferometer

The Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill. Bulletin 204-59 describes the Gaertner Vibration Iinterferometer, which is specially designed for extremely precise checking and calibration of accelerometers. Bulletin gives applications, product features, description and specifications.

For more data circle 18 on Postpaid Card

Drilling and Tapping Machine

Burgmaster Corp., 15001 South Figueroa St., Gardena, Calif. Bulletin describes the bench model six spindle turret drilling and tapping machine. The machine is fully described and complete specifications and accessory equipment informa-tion is presented. Case histories are included that show the savings, convenience and precision work performed on this machine.

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Air Cylinders

Allenair Corp., Department MMS-1, 255 East Second St., Mineola, N. Y. Flyer presents single acting, valve-in-head air cylinders, Models AVSA and AVSR. For more data circle 20 on Postpaid Card

Tap Selector

The Hanson-Whitney Co., 269 Bartholomew Ave., Hartford 2, Conn. 28 page easy reference tap selector spells out in detail the correct tap to use for optimum production, regardless of the material, type of hole and so on. By means of easy-to-use reference charts, all necessary information is cross-referenced for easy checking by the engineer, produc-tion man or purchasing agent. In addition to the correct tap, the selector lists the correct gage and price for each.

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Cross Slide Table

Lawrence H. Cook, Inc., 67 Massasoit Ave., East Providence, R. I. New, informative specifications sheet describes in vivid detail the precision cross slide table. Flyer gives all details and specs on this precision, lightweight cross slide table for all work on mold cavities, plungers, dies, templates and other intricate milling.

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Metal Sawing Machines

Peerless Machine Co., Racine, Wis. Bulletin No. 7000 gives limited specifications on the full line of Peerless power metal cutting saws.

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Surface Measurement Reference

Clevite Corp., Brush Instruments Division, 37th and Perkins, Cleveland 14, Ohio. Pocket size, handy, 12 page surface measurement reference manual contains important excerpts from the American Standard ASA B46.1-1955 for surface

roughness, waviness and lay. This 4 by 71/4 inch, profusely illustrated manual covers classification of surface characteristics, stylus type measuring instruments, pre-cision reference specimens, roughness width cutoff and notes on con-trol of surface roughness. A conversion chart is provided for converting arithmetical average to root mean square averages in microinches. The Surfindicator, a production gage for finish control, is also described.

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Mounted Wheels

Cincinnati Milling Machine Co., Cincinnati Milling Products Division, Cincinnati 9, Ohio. Publication No. PG-358 entitled "Cincinnati Mounted Wheels' contains information as selecting the correct wheel grade, starting grades, ordering, marking chart, bond types, treatments and mandrels.

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Hot Plates

Thermo Electric Manufacturing Co., 488 Huff St., Dubuque, Iowa, Bulletin No. HP-221 presents the Thermolyne Hot Plates, Type 2200, which are large size units with variable temperature control to 700 degrees F. Specifications and price data are included.

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Band Sawing Machine

The Henry G. Thompson and Son Co., Chapel and Will Streets, New Haven 5, Conn. Circular No. 502-59 contains full

data on the new Milband Machine Tool, which has been designed and built from the bottom up to provide the extra ruggedness and rigidity needed to handle high speed steel band blades with full efficiency.

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Toolroom Lathe

Rivett Lathe and Grinder, Inc., Department MMS-1, Brighton 35, Boston, Mass. 16 page catalog on the 1020 Toolroom Precision Lathe

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Taps, Dies, Gages
Field Tool Supply Co., Department SP. 33 South Desplaines St., Chicago 6, Ill. Bulletin gives complete size information on right and left hand high speed taps, dies and thread plug gages. Other products described are special reamers and extra length drills. The unusual feature about these special tools is that they are in stock for immediate delivery.

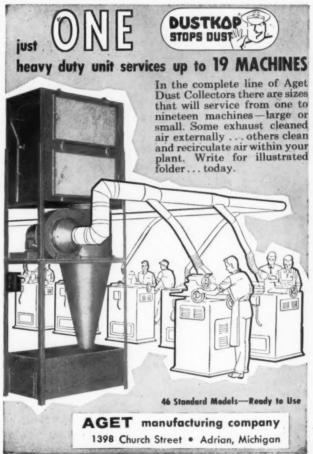
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Lubricant

The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn. Bulletin 126 gives details on Molykote G Lubricant. For more data circle 30 on Postpaid Card

Electrolytic Grinder

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich. Bulletin No. 244T presents the Hammond Model EG-10 Oscillating Electrolytic Grinder. Standard equipment, specifications and grinding wheel specs are given. For more data circle 31 on Postpaid Card



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Unitized Tooling

Punch Products Corp., 3812 Highland Ave., Niagara Falls, N. Y. Unipunch Maintenance Manual of Unitized Tooling is an unusual 20 page book, written by Ray I. Smith, Jr., Industrial Engineering Supervisor at the Bulter Manufacturing Company. This maintenance manual has excellent helpful information for users of any type of punches and dies. For more data circle 32 on Postpaid Card

Collet Stops

The Bystrom Co., 6106 Park Ave., South, Minneapolis 17, Minn. Flyer on collet stops for second operation and lathe work. Features include all friction lock; no thread adjustment; quick change with less than a minute to install.

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Stainless Steel Tubing

Allegheny Ludlum Steel Corp., Department MS-26, Oliver Building, Pittsburgh 22, Pa. 34 page booklet on stainless steel

tubing. It gives details on the various sizes, grades, design data, corrosion resistance and other information valuable to industries interested in both welded and seamless stainless steel tubing.

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Control Unit

The Bellows Co., Department MMS 160, Akron 9, Ohio. Bulletin LA-15 gives complete information on the Bellows Lubri-Air Control Unit, which filters harmful dirt and moisture out of the air stream.

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and positive shutoff of bulk materials from bins and
chutes and for
regulating eddyfree air in heating
and ventilating.
For more data circle

For more data circle 36 on Postpaid Card **Numbering and Coding Machine**

Pryor Marking Products, 434 South Wabash Ave., Chicago 5, Ill. Flyer on the Powermark Electric Numbering, Coding and Dating Machine for carbon and original forms.

For more data circle 37 on Postpaid Card

Drill Jig Bushings

American Drill Bushing Co., 5107 Pacific Boulevard, Los Angeles 58, Calif. 1960 Catalog gives complete details and illustrations on drill jig bushings so that it is easy to select the correct size and

type. Printed on durable card stock, this catalog folds out for easy reference and type comparison. Tables are color-coded, prices are listed and quantity discounts are shown.

For more data circle 38 on Postpaid Card

Air Gage

Dearborn Gage Co., Air Gage Division, 3230 Ford Road, Garden City, Mich. New 16 page catalog contains complete spees and price information on the expanded line of Dearbornaire precision air gaging instruments, elements and other related accessory equipment.

For more data circle 39 on Postpaid Card

Tappers

Procunier Safety Chuck Co., Department 1, 12 South Clinton St., Chicago 6, Ill. Illustrated brochure gives complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

For more data circle 40 on Postpaid Card Drill Unit

The Hartford Special Machinery Co., 3700 Homestead Ave., Hartford 12, Conn. Complete information on the new Model 17-400 Drill Unit, including dimensions, specs and other engineering data is covered in Circular No. GC-400. For more data circle 41 on Postpaid Card

Haists

The Euclid Crane and Hoist Co., Chardon Road, Cleveland 17, Ohio. Six page color brochure on Series S Euclid Hoists. For more data circle 42 on Postpaid Card



free literature . . .

Engine and Toolroom Lathes

The Springfield Machine Tool Co., Springfield, Ohio. Bulletins 190, 195 and 201 give data on the Model "S" Lathe, which provides 24 spindle speeds and 60 feeds and threads, choice of three motors. Model 280 Lathes are designed for shops where more straight-line work is required. They provide 16 spindle speeds, 60 feeds and threads.

For more data circle 43 on Postpaid Card

Reamers and Counterbores

Twentieth Century Manufacturing Co., Box 429-MM, Libertyville, Ill. Revised catalog describes and illustrates an unusually large selection of decimal reamers and counterbores.

For more data circle 44 on Postpaid Card

Band Saw

The Lincoln Electric Co., Cleveland 17, Ohio. Design Ideas No. 24 answers these questions: how to get more out of a metal cutting band saw with a designed 10 by 10 inch capacity; how to make it

better looking in forms of today's machine tools; how to extend blade life; how to achieve more automaticity in operation; how to increase angular cutting radius; and many more.

For more data circle 45 on Postpaid Card

Drill Presses

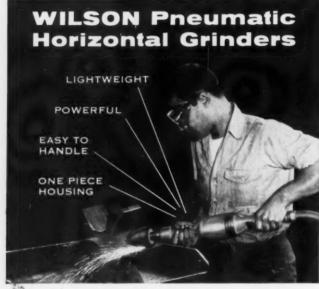
Boice-Crane Co., 937 West Central Ave., Toledo 6, Ohio. A new brochure on 18 and 24 inch constant power gearshift drill presses includes specifications and full descriptions of all features on seven models.

For more data circle 46 on Postpaid Card

Heavy Duty Lathe

Nebel Machine Tool Corp., 3409 Central Parkway, Cincinnati Ohio. Booklet No. 213 is fully illustrated and has eight pages devoted to the Model HD 2516 Heavy Duty Lathe. Full engineering details and specifications are given, together with a point-bypoint discussion of features.

For more data circle 47 on Postpaid Card



Faster grinding...less operator fatigue

Wilson's new Horizontal Grinders speed grinding, buffing, whre wheel work and many other metal removing and finishing operations. Available in various sizes and models, with speeds ranging from 3100 to 12,000 r.p.m. Write for Catalog PT-58.

THOMAS C. WILSON, INC. 21-11 44th Avenue, Long Island City 1, New York

BETTER TOOLS FOR BETTER WORK

For more data circle 435 on Postpaid Card

Four Slide Machines

The A. H. Nilson Machine Co., 627 Bridgeport Ave., Shelton, Conn. Nilson General Catalog on automatic four slide equipment. Four slide machines are designed to produce either wire forms or metal stampings at high production rates.

For more data circle 48 on Postpaid Card

Surface Grinders and Wheels

The Blanchard Machine Co., 64 State St., Cambridge 39, Mass. "The Art of

Blanchard Surface Grinding" (fourth edition) includes information on surface grinders, a variety of silicate, resinoid and vitrified bonded wheels and segments.

For more data circle 49 on Postpaid Card

Optical Aids

Bausch and Lomb Optical Co., 893 St. Paul St., Rochester 2, N. Y. Time and money saving data on surface comparators, industrial magnifiers, microscopes, micrometer discs, Brinell microscopes, copes, microscopes wide field tubes and shop microscopes.

For more data circle 50 on Postpaid Card

Valves

The Fulflo Specialties Co., Inc., 416 Fancy Ave., Blanchester, Ohio. New catalog and reference to the application of Oil By-Pass Relief Valves simplifies the selection of valves for a wide range of service. Included are charts for valves and pipes, dimensions, specifications and other data.

For more data circle 51 on Postpaid Card

Carbide Tools

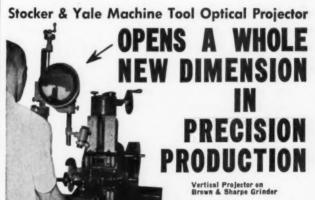
Besly-Welles Corp., 120 Dearborn Ave., South Beloit, Ill. Comprehensive catalog and price list of Besly Carbide Tools that use Kennametal material.

For more data circle 52 on Postpaid Card

Valves

Hunt Valve Co., Salem, Ohio. Bulletin No. 594 on Hunt PDQ Valves. Features, specifications and application information are given.

For more data circle 53 on Postpaid Card



Vertical or horizontal models. Standard magnifications of 10X, 20X, 31.25X, 50X, 62.5X, 100X. Measures in increments of .001" or .0001"

Reduces costs — cuts machine downtime, saves operator time, speeds production, reduces scrap, speeds operator training. Improves quality — eliminates transfer errors, allows grinding to layout, permits seeing and measuring stock removal. Broadens market — allows you to do work you otherwise would not be able to do.

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Catalog on Machine Tool Projector Model 7M

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For more data circle 436 on Postpaid Card

free literature . . .

Automatic Mill

Sieburg Industries, Inc., Danbury Industrial Park, Danbury, Conn. Four page color bulletin on the AutomaticMILL, which is a new precision machine that applies automation techniques to achieve high speed production milling of small parts in large quantities. Information is presented on operation, features, advantages and specifications.

For more data circle 54 on Postpaid Card

Hydraulic Presses

Rodgers Hydraulic, Inc., 7447 Walker St., Minneapolis 26, Minn. Catalog 337 has complete specifications, tables and data on Rodgers Presses for metal forming and drawing, making it easy to determine the right press for the job. For more data circle 55 on Postpal Card

Small Boring Machines

Ex-Cell-O Corp., Detroit 32, Mich. Bulletin 315925 describes and illustrates two small precision boring machines, a single

end and a double end model. Folder also illustrates various spindle setups and items of equipment that are available to add to the productivity and versatility of these machines.

For more data circle 56 on Postpaid Card

Pipe Fittings

Flick-Reedy Corp., Tru-Seal Division, 7N023 York Road, Bensenville, Ill. "Case Histories, Sheet No. 2" provides five illustrated case histories of the use of Tru-Seal Fittings to solve piping problems in industry.

For more data circle 57 on Postpaid Card

Press Brakes

Niagara Machine and Tool Works, Buffalo 11, N. Y. Four page Bulletin No. 91 describes the new line of hydraulic press brakes. Featured is a selection chart, showing at-a-glance the essential differences between mechanical and hydraulic brakes in use, tonnage, stroke, speed, accuracy and ram adjustment.

For more data circle 58 on Postpaid Card

Free Technical Bulletin on Surface Measurement

gives all the meat of ASA Standard B46.1-1955 on surface roughness, waviness and lay, plus helpful supplementary material. Arranged for easy reading and convenient reference. Includes these sections:

- Basic definitions with profile records of typical surfaces.
- How to designate the characteristics of roughness, waviness and lay, on drawings.
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MICROMETRICAL MANUFACTURING COMPANY

345 S. MAIN ST., ANN ARBOR 7, MICHIGAN For more data circle 437 on Postpaid Card

Saw Blades

Circular Tool Co., Inc., Providence 5, R. I. Catalog O lists more than 1,200 Circle R items, such as screw slotting saws, carbide tipped saws, slitting discs, combination center drills and solid carbide slotting saws.

For more data circle 59 on Postpaid Card

Trigonometric Chart

J. T. Slocomb Co., South Glastonbury, Conn. A handy, pocket size trigonometric chart for the quick, easy figuring of the

natural functions of angles, sines, cosines, tangents, cotangents, secants and cosecants. The chart incorporates actual diagrams of the most common angular problems, along with simple r e f e r e n c e formulae.

For more data circle 60 on Postpaid Card

Band Machines

The DoAll Co., Des Plaines, Ill. Eight page catalog describes and illustrates the Zephyr line of high tool velocity band machines. Data is provided on applications, design details, specifications and attachments. For more data circle 1 on Postyaid Card

Spray Gun

Metallizing Company of America, Inc., 3520 West Carroll Ave., Chicago 24, Ill. Attractive, fully illustrated brochure demonstrates the "Powder Jet" pressurized metal spray guns. Brochure gives complete information on the guns and their various industrial applications, such as metal build-up,

repair and salvage of parts and equipment and ceramic coating. For more data circle 62 on Postpaid Card

Wheel Forming Attachment

Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. Four page color brochure on the Model No. 5 Diaform Wheel Forming Attachment for permanent mounting to the spindle housing of a toolroom surface grinding machine.

For more data circle 63 on Postpaid Card

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ECONOMY ELEVATING TABLE

- DIE HANDLER . CONSTANT HEIGHT TABLE
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Self-locking Acme screws hold load safely, securely, at any height. Roller bearing wheels.

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No projecting parts — all four sides accessible; crank studs at both ends; three table surfaces.

CONOMY

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For more data circle 438 on Postpaid Card

free literature . . .

Impact Tool

Ingersoll-Rand, 11 Broadway, New York 4, N. Y. Brochure presents the new electric heavy duty Impactool for lower costs on maintenance and production. For more data circle 64 on Postpaid Card

Arc Welding Procedures

Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Data

Card TDC-155 summarizes the various recommendations for arc welding. In addition to indicating the proper type of electrodes to be used, it provides information on suggested preheat and postheat treatments. Steels discussed are carbon, chromium-molybdenum alloy and stainless.

For more data circle 65 on Postpald Card

Aluminum Nuts

Waltham Precision Instrument Co., 221 Crescent St., Waltham 54, Mass. Bulletins 3002 and 3003 describe a new design

in aluminum selflocking nuts, which afford higher temperature, strength-to-weight and reusability performance with more accurate torque control. Literature lists sizes and dimensions for coarse and fine thread series.

For more data circle 66 on Postpaid Card

Lapping Machines

Crane Packing Co., 6418 Oakton St., Morton Grove, Ill. Information on the complete Lapmas-ter story. Bulletins describe the Lapmaster line and a chart on measuring flatness is included.

For more data circle 67 on Postpaid Card

Grinders and Drills

Olivetti Corporation of America, Machine Tool Division, 42-33 North-ern Boulevard, Long Island City 1, N. Y. 12 page color brochure on such precision machine tools as drill presses, planer type milling machines, grinding machines, special purpose machines and fixtures.

For more data circle 68 on Postpaid Card

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UNEXCELLED ACCURACY



on any press brake work upon request

Press Brakes Press Brake Dies Straight-Side-Type Presses Hand and Power Bending Brakes Special Forming Machines



DREIS & KRUMP MANUFACTURING CO.

7418 S. Leomis Blvd., Chicago 36, Illinois For more data circle 439 on Postpaid Card

Lathes

Marton Equipment, Inc., 202 Rantoul St., Beverly, Mass. Four page color brochure on the new Willson 11 inch center gap bed lathe, that offers bed lengths up to 29 feet. The many features of this lathe are discussed, along with dimensional specifications.

For more data circle 69 on Postpaid Card

Micro-Drilling Manual

The Dumore Co., 1302 Seventeenth St., Racine, Wis. 22 page technical "how to" manual tells all about the problems,

practices, techniques and equipment for microdrilling holes from 0.001 to 0.020 inch in diameter. Illustrated data includes list of sources for related equipment needed to do efficient, economical microdrilling work. Booklet MD 85.

For more data circle 70 on Postpaid Card

Valves

Double A Products Co., Manchester, Mich. 12 page set of data sheets, Series No. 9186, describe and portray the full Double A line of manually operated, four way directional valves. Sheets contain operation diagrams, parts drawings and mounting diagrams for each valve, as well as spool charts for all of the many spools available.

For more data circle 71 on Postpaid Card

Cable Connector

Ampco Metal, Inc., Box 2004, Milwaukee 1, Wis. Bulletin W-32 describes a new welding cable connector with a locking action. The illustrated brochure depicts the offset design of this cable connector and points out advantages. Replacement parts are also listed. For more data circle 72 on Postpaid Card

Comparators

Jones and Lamson Machine Co., Comparator Division, 521 Clinton St., Springfield, Vt. 12 page brochure is entitled "Optical Analysis of Gears and Splines." The company offers a new optical method for the inspection and analysis of fine pitch involutes.

For more data circle 73 on Postpaid Card



for Medium Production Jobs

Service



Rugged in design, dependable in operation, the Wells Model 600 is the ideal saw for tool and stock rooms . . . gives excellent service on medium production jobs. Uses 5%" blade. Adjustable, uniform gravity feed is provided by hydraulic stabilizer and special coil spring. Casters available for portability. Write for Bulletin 260-A.



The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION 808 Tyler St., Three Rivers, Michigan

For more data circle 440 on Postpaid Card

free literature . . .

Induction Heating

Lepel High Frequency Laboratories, Inc, 55th St. at 37th Ave., Woodside 77, N. Y. New edition of the Lepel Induction Heating "Review" features a topical and interesting story on the floating zone method for growing germanium or silicon crystals; zone refining and zone leveling; also, an article on coil design and construction.

For more data circle 74 on Postpaid Card

Drilling and Tapping Machines

Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Ill. Data on a single spindle horizontal drilling and tapping machine, designed to handle drilling tapping, counterboring, burring, countersinking, facing, reaming and hollow milling operations on screw machine parts, die castings, stampings or headed parts. For more data circle 75 on Postpaid Card

Air Filters

American Air Filter Co., Inc., Department PD, 215 Central Ave., Louisville 8, Ky. Bulletin No. 207 describes the construction and application of permanent washable unit air filters.

For more data circle 76 on Postpaid Card

Toggle Clamps

Erico Products, Inc., 2070 East 61st Place, Cleveland 3, Ohio. 14 page catalog on Caddy Toggle Clamps. Various types are illustrated and described, as well as specials and accessories.

For more data circle 77 on Postpaid Card

Pumps and Controls

American Brake Shoe Co., Denison Engineering Division, 1160 Dublin Road, Columbus, Ohio. Comprehensive Bulletin No. 220 is a 72 page catalog that gives full design details and operating characteristics on hydraulic pumps, fluid motors and valves.

For more data circle 78 on Postpaid Card

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WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
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Locknuts

The Palnut Co., 116 L Glen Road, Mountainside, N. J. 20 page Catalog 592 shows complete line of Palnut spring tempered steel locknuts, including regular hex, integral washer, acorn, wing and adjusting nut types. It gives details of design and locking principle, advantages, typical applications, dimensions, load ratings, materials and finishes.

For more data circle 79 on Postpaid Card

Metal Cutting Concentrate

Park Chemical Co., 8074 Military Ave., Detroit 4, Mich. Bulletin on Kem-Cut Metal Cutting Concentrate, which is completely inhibited against bacteria action.

For more data circle 80 on Postpaid Card

Steel Equipment Products

Lyon Metal Products, Inc., 1 Plant Ave., Aurora, Ill. 92 page general catalog (No. 100-H) illustrates the complete Lyon line of steel equipment products for business, industry, institutions and homes. It contains product views, complete specifications and installation views, depicting the many products in action. Data is

included on office machine cabinets, office machine tables, typewriter attachments for Lyon desks; drawing tables, woodworking benches, desk high bookcases, full height bookcases and drawer tool stands.

For more data circle 81 on Postpaid Card

Cold Heading Copper

John Hassall, Inc., Department TR, Cantiague Road, Westbury, N. Y. Four page reprint on the economy and methods of cold heading copper. Literature tells how copper alloys are economically cold headed into many shapes and the unlimited potential that is offered, when cold heading is used with such secondary operations as slotting, drilling and tapping.

For more data circle 82 on Postpaid Card

Bench Lathes

South Bend Lathe, Inc., 425 East Madison St., South Bend 22, Ind. Bulletin contains information on the 9 inch 10K Lathe and the 9 inch or 10K Gap Bed Lathe. These are precision bench lathes that are simple, practical and durable. For more data circle 83 on Postpaid Card

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Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

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Edroy Products Co.

Dept. P., 480 Lexington Ave. New York 17, N. Y.

For more data circle 442 on Postpaid Card

free literature . . .

Tubular Element Furnaces

Harper Electric Furnace Corp., 110 Pearl St., Buffalo 2, N. Y. Bulletin GT-1059 presents the recently modernized Harper line of Globar Tubular Element Furnaces for processing a wide variety of work at temperatures up to 3,000 degrees F. With operating and control features concisely described, the bulletin includes several illustrations of air and controlled atmosphere models, as well as dimension drawings and spees.

For more data circle 84 on Postpaid Card

Surface Plate Accessories

The Herman Stone Co., 1860 North Gettysburg Ave., Dayton 27, Ohio. Bulletin B is a combination catalog and price list on precision accessory equipment and special services for granite surface plates. It is a four page, two color publication which describes and illustrates a complete line of accessories, including "Air Lift" angle blocks and riser blocks, straightedges, parallels, toolmakers' flats and many others.

For more data circle 85 on Postpaid Card

Servo Motors

Reliance Electric and Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio. Bulletin C-2503 describes the new line of high response d.c. servo motors in sizes from ¼ through 1 h.p. Included are a list of features, dimensions, characteristics and typical applications for these motors, which provide fast response in industrial applications that require rapid starts, stops and reversals.

For more data circle 86 on Postpaid Card

Tungsten Carbide Balls

Industrial Tectonics, Inc., 3686 Jackson Road, Ann Arbor, Mich. New price list on the company's tungsten carbide balls. For more data circle 87 on Postpaid Card

Saw Grinder

W. Von Arnauld Co., 95 Grove St., Oakland, N. J. Four page color bulletin on the Tempo Type AS 6-10 Automatic Saw Blade Grinding Machines. These machines are designed for grinding of segmental circular saws and all types of metal cutting circular saw blades having either straight or curved tooth profiles, as well as for special profiles of rapid cutting off machines.

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2 to 15 spindles — drilling area to 351/3" Commander MULTI-DRILLS — adjustable multiple spindle drill press attachments—are sold and serviced by a nation-wide network of Commander Distributors—experienced, helpful specialists in solving drilling and tapping problems. Write for the name of your nearest Distributor and the complete Commander Production Tool Catalog which contains full details on every MULTI-DRILL and many other production drilling and tapping tools.

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- Thumb roll permits quick and easy operation
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- 100% measuring capacity (outside, inside and depth.)

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The swinging jaw allows a very easy, rapid and extremely accurate measurement of parts that have faces which do not lie along the same axis.

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NEWS

of the industry

Obituaries . . . new companies, divisions and expansions . . . educational exhibits . . . officers.

Edited by L. L. BALDHOFF

SUPERIOR HONE BUILDS PLANT IN TENNESSEE

Formal groundbreaking ceremonies were recently held in Erwin, Tennessee, at the site of the new Superior Hone Corporation plant. When completed, about April 1st, the plant will contain 15,000 square feet of floor space. As soon as the building is completed, machinery will be installed. Employment will be approximately 50 persons, who will be engaged principally on production runs and abrasive products. A. W. Aspin, Superior Hone engineer, will supervise construction of the plant.

Main offices, engineering and development work and facilities for special runs of honing machines will continue at the Elkhart, Indiana, company headquarters.

* modern machine shop *

R. J. NEBEL

The Beverly Shear Manufacturing Company, Chicago, Illinois, recently announced the death of R. J. Nebel, vice president.

* modern machine shop

BUFFALO FORGE ELECTS M. E. REINER TO BOARD

The Buffalo Forge Company, Buffalo, New York, recently announced the election of Milford E. Reiner to



Superior Hone Corporation plant which is being constructed in Erwin, Tennessee

the board of directors. Mr. Reiner joined the company as assistant controller in 1941, was promoted to controller in 1955 and appointed treasurer in 1959. He was associated with Ernst and Ernst for 16 years, where he supervised the handling of the Buffalo Forge Company account. A graduate of Masten Park High School, Mr. Reiner received his Certified Public Accountant designation after attending the University of Buffalo. Buffalo

Forge Company also announced the election of Theodore M. Dillaway as vice president and George P. Schivlev as vice president of manufacturing. Mr. Dillaway continues as a director and secretary of the company and Mr. Schivley remains a director.

* mms

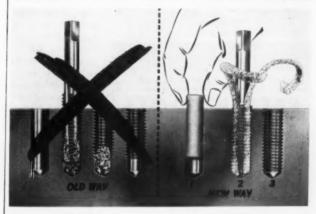
DoALL SPONSORS EXHIBIT

A "soft sell" campaign on wheels, involving a million-year panorama of tools, is proving to be a successful good will aid for a large midwestern company.

The institutional program is actually a mobile, non - commercial educational exhibit, sponsored by The DoAll

Company, Des Plaines, Illinois, distributor of machine tools, cutting tools and precision measuring instruments. Weighing 6,200 pounds, it is transported by a special truck. Called "The Story of The Cutting Edge," the exhibit already has been viewed by approximately 25,000 users and potential users of industrial tools during 150 showings that were given before technical societies, schools and management and educational groups.

Chip problems eliminated when you tap blind holes with new TAP CARTRIDGES



Pictured on right shows (1) a tap cartridge (wax pellet) dropped into drilled hole. As tap works into hole (2) solid flow of wax carries chips along and out flutes as fast as chips are made. Bottom of hole is clean when taps get there. Result (3) a clean accurate hole.

- Tap to bottom of hole in one pass.
- Tap cleans itself on next hole.
- Eliminates rejects, torn threads, oversized holes.
- Extends tap life 3 to 5 times.
- · No allowance for chip room.
- Obtain a smoother, more uniform thread.
- Can be used in steel, iron, aluminum, plastics and the newer exotic metals,

For FREE SAMPLES give tap size, threads per inch, depth of drilled hole. Sizes 0-80 thru 11/4". Write or phone today.

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For small production runs on 1/8" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened straight or diamond pattern knurls of standard 1/2" dia. Forged steel frame is self-centering. Write for illustrated folder.

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For more data circle 447 on Postpaid Card

"The Story of The Cutting Edge" has three main components. One is a section panel 43 feet long on which are chronologically displayed the stepby-step authentic development of cutting edges from stone, to bronze, to steel, to carbides and ceramics. Among prehistoric items are tools fashioned from the bones of animals. In addition, there are graphic examples of what each step in improved cutting tools has meant to man in his economic and cultural development. These advancements in human progress, resulting from cutting tool improvements, are explained further in a lecture.

A lecture-slide presentation of modern machining techniques comprises another part of the exhibit. Fundamentals are presented on color slides projected on a 16 foot screen, constructed especially for the traveling exhibit.

The third part consists of a display of all kinds of cutting tools and parts produced from numerous materials by various machining practices.



C. G. Schelley, director of educational research at DoAll, points out part of historical panorama of tools he uses to bring the story of "The Cutting Edge" to technical societies, schools, management and educational groups.

NEW COMPANY FORMED

A new sales company has been formed for the sale of collet stops. The Bystrom Company, 6106 Park Avenue, South, Minneapolis 17, Minnesota, is handling collet stops designed for second operation and lathe work.

* modern machine shop 7

WELDON NAMES NEW GENERAL SALES MANAGER

S. E. Smith, Jr. has been named general sales manager of The Weldon Tool Company, Cleveland, Ohio. He succeeds J. H. Devlin, vice president in charge of sales, who has retired after 22 years of service with Weldon.

modern machine shop *

GORTON APPOINTS NEW WORKS MANAGER

George Gorton Machine Company, Racine, Wisconsin, has announced the appointment of Eugene J. Anspach as works manager. This includes responsibility for production, assembly, production office, methods and tool engineering.

Mr. Anspach takes over from Charles Gorton, vice president, who is presently organizing and setting up a considerably enlarged procurement

department.

Mr. Anspach is past chairman of the American Society of Tool Engineers, is a member of the Society for Advancement of Management, the American Society of Testing Materials and the American Ordnance Association.

* modern machine shop *

B. & S. ANNOUNCES NEW HYDRAULICS DIVISION SALES ORGANIZATION

The Hydraulics Division of Brown and Sharpe Mfg. Company, Providence, Rhode Island, has announced

PALMGREN Machine Vises and Rotary Tables

There are 64 different models and types of Paimgren vises, rotary tables, milling attachments and other machine tool accessories—the most complete line of vises and tables available anywhere.





TILTING, INDEXING and ROTARY TABLE \$13950

No. 60B 6"
SWIVEL MACHINE VISE \$9995

Used in all industries - everywhere.

Get this FREE Catalog NOW



No. 2B 4" HEAVY DUTY ANGLE VISE \$14905



CHICAGO TOOL AND ENGINEERING CD. 8399 S. Chicago Aye., Chicago 17, III.

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Another

VICTOR VALUE

TOP QUALITY - LOWEST PRICES

Our Special Import . . .

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

| New |
|---------|
| \$ 2.85 |
| 5.00 |
| 7.50 |
| 10.25 |
| 15.00 |
| 20.00 |
| 26.00 |
| 32.00 |
| |

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order Today—Immediate Shipment from Stock!
VICTOR MACHINERY EXCHANGE, INC.

Dealers in Tool Room Equipment

Dept. B, 251 Centre St.

New York 13, N. Y. Tel.: CAnal 6-5575

For more data circle 449 on Postpaid Card

the organization of a new sales force to provide specialized service to original equipment manufacturers and distributors for the company's line of gear, yane and centrifugal pumps.

Under the direction of Borje Rosaen, general sales manager of the division, this new group will have complete responsibility for pump and defense product sales. J. Arthur Lord, who has been associated with engineering and sales within the Hydraulics Division for 16 years, has been named product sales manager and technical consultant. Mr. Lord will maintain personal contact in the southern, southwestern and west coast territories.

William T. Nystrom, formerly director of sales for the company's Industrial Products Division, has been appointed distributor sales manager

> and will also be responsible for sales and technical assistance in New England and Canada

The Mid-Atlantic territory will be covered by Edwin R. Weeden and the Mid-West area by Robert F. Kippax, both formerly with the Industrial Products Division. Mr. Weeden will be located in Philadelphia and Mr. Kippax in Fort Wayne, Indiana.

The Industrial Products Division will no longer be responsible for the sale of pumps.

The organization of this new group of specialists will make available to Brown & Sharpe's pump customers and industrial distributors on the spot service and know-how for the solution of fluid handling problems.





Just ask a *Snap-on* sales engineer about companies that have cut socket breakage by switching to *Snap-on*.

These heavy-duty industrial sockets have the extra heft, accurate dimension, and special-steel toughness to take impact pounding.

Result: more work hours per socket—far less downtime due to frequent breakage of ordinary sockets.

Talk sockets with your *Snap-on* man. He can offer competent advice on what's best for you in the wide *Snap-on* range of industrial sockets. You'll get fast action from a nearby *Snap-on* branch on regular or emergency needs.

SNAP-ON TOOLS

8109-C 28TH AVENUE

KENOSHA, WISCONSIN
For more data circle 450 on Postpaid Card

C.T.M.A. ELECTS OFFICERS

The Cutting Tool Manufacturers Association, at its annual meeting at the Harmonie Club, elected George N. Popham, of the Gorham Tool Company, as president.

Kenneth R. Beardslee, of Metallurgical Products Division, General Electric, was elected vice president.

Glenn E. Johnston, of Star Cutter Company, was elected treasurer and Martin J. Ewald was re-elected execu-

tive secretary. E. J. Kaiser, Davis Boring Tool Division, Giddings and Lewis Machine Tool Company, Fond du Lac, Wisconsin, and David Nelson, Detroit Broach and Machine Company. Rochester, Michigan, were elected directors for a three year term.

Merritt D. Hill spoke on the subject of "The Place of the Business Man in Politics."

BARNES DRILL **ELECTS OFFICERS**

Roger Marriott has been elected president and general manager of Barnes Drill Company, Rockford. Illinois. Harold A. Johnson has been

named executive vice president and Charles Birks has been elected secretary-treasurer of the company.

Prior to the election by the board of directors, A. M. Johnson, president of the company, announced his retirement after 52 years association with the firm. W. M. Fairbairn continues as chairman of the board and LaVerne Cogswell remains as vice president in charge of sales. A. M. Johnson will continue to serve as a director and consulting engineer for the company.

New Stanley-Yankee Vises cut costs at bench and machine



No. 4993A Swivel-Tilt Vise

No. 993A **Utility Vise** 3" Jaws



New No. 4993A Swivel-Tilt Vise combines swivel base and angle base for quick compound angle set-ups. The exclusive dovetail slot in the vise permits adjustment the full length while retaining the swivel feature. Vise can be detached from swivel-tilt base quickly and easily.

New No. 993A Utility Vise with 3" Jawsprecision-built for machine shop use.

Vises and bases are available separately. Ask your industrial supply distributor for details, or write Stanley Tools, 9103 Elm St., New Britain, Connecticut.

STANLEY The Tool Box of the World

For more data circle 451 on Postpaid Card

March, 1960

MODERN MACHINE SHOP

187



equipment

Descriptions of new machines, tools and materials for metalworking.

Edited by L. L. BALDHOFF

PORTABLE THREAD MILLER FITS ANY LATHE

The Fen-Thread-Miller is a compact, portable unit which is quickly attached to any lathe for the purpose of accurately threading all types of plastics and metals. Manufactured by

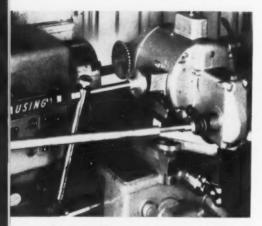


Figure 1—This versatile Fen-Thread-Miller is a compact and portable unit which can be quickly attached to any lathe for accurately threading all types of plastics and metals.

the Fen-Thread-Machine Co., Inc., 3107 North Broad St., Philadelphia 32, Pa., it is said that this unit can duplicate every operation of a more costly machine. A complete setup can be made in four to five minutes by one man. Thread-milling is more precise and smooth, and the machined part maintains its concentricity without distortion, thus eliminating rejects. Because of its extreme accuracy, the pitch diameter, root and pitch angle are held to a close tolerance of 0.001 inch. Only one pass is required to thread-mill any 60 degree, Acme or square thread. Unique is its ability to thread right up to the shoulder without undercutting. Parts may be machined with or without coolants, including all plastics to beryllium, stainless steel and titanium.

Also unique in its operation is its ability to machine special and medium pitch taps. This feature is particularly useful in field operations, where new taps or dies may be required without prior notice.

A variety of cutters is available, ranging from 1/32 inch to 9 inches for external threading, and from ½ inch to 9 inches for internal threading. Any

and materials

9 to 20 inch screw cutting engine lathe can be used with the Fen-Thread-Miller, which has the capacity of cutting from 4 to 200 threads per inch.

The unit is ideal for cutting multiple threads. Weighing only 40 to 45 pounds, the Fen-Thread-Miller is ruggedly constructed of steel, brass and aluminum for long life.

This versatile and long lasting thread-miller will find many applications in tool and die shops, instrument and machine shops and with mold-

makers. Anyone who is interested may have critical materials thread-milled, according to specifications or blueprints and delivered free of charge, to demonstrate the adaptability of this thread-miller for regular and special applications. For more data circle 89 on Postpaid Card

modern machine shop

ABRASIVE CUT-OFF MACHINE IS FULLY AUTOMATIC

A. P. deSanno and Son, Inc., Phoenixville, Pa., has announced its Radiac Type "N16-FA" Abrasive Cut-Off Machine, for fast, accurate production cutting of solids up to 1 inch in diameter, automatically. This is a wet cutting machine, which is sturdily built. It is designed to cut bar stock, either round or square, up to 1 inch, in from 1/4 to 6 inch lengths.

A 16 inch abrasive wheel is driven by a 7½ h.p. ball bearing motor by means of five vee belts. The motor is operated by a magnetic starter with a remote start-stop pushbutton.

Coolant is supplied from a 10 gallon storage tank and pump, located within the base of the machine. Coolant is directed on the abrasive wheel and work at the point of cutting by two jets. The coolant pump motor is oper-



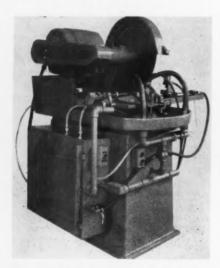
Figure 2—These are typical parts which have been threaded on Fen-Thread-Miller.

ated by a separate manual starter.

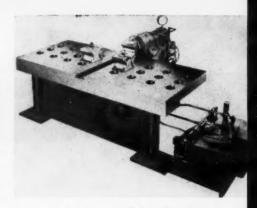
By means of air cylinders, the stock is fed by a movable carriage, through a stationary vee block, and contacts an adjustable work stop. At this point, the work is clamped and the cutting wheel makes its downward stroke. When the abrasive wheel completes the cut, it contacts a compensator which returns the head to its uppermost position and, at the same time, raises the work stop, permitting the cut piece to fall out by gravity. When the head reaches its uppermost position, air cylinders immediately lower the work stop and return the carriage to a pre-set starting position to continue the cycle of operation.

Speed of the air hydraulic cylinder, for raising and lowering the cutting head, is adjustable. Two sets of interchangeable wheel flanges are supplied as standard equipment—3 and 6 inch diameter.

For more data circle 90 on Postpaid Card



Type "N16-FA" Abrasive Cut-Off Machine



Horizontal Tube Straightening Press

HORIZONTAL TUBE STRAIGHTENING PRESS

K. R. Wilson, Inc., 216 Main St., Arcade, N. Y., announces a horizontal press for tube straightening. Illustrated is a 100 ton, horizontal, self-contained, hydraulic press with a sensitive hand control required for straightening.

The moving ram face is guided in the dovetail for the full 24 inch stroke. The bed is 48 inches right to left, by 108 inches front to back. Two 5 inch diameter pins with swivels are utilized for various diameter tubes. Nylon liners in swivels protect the high finish on the bed during the straightening operation. The unit is powered by a 7½ h.p. double end motor.

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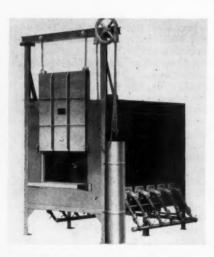
FLOOR-TYPE HEAT TREATING OVEN FURNACES

A 30 inch series of larger "Buzzer" Gas-Fired Heat Treating Furnaces, four models in all, have been added to the existing line of ten such furnaces engineered and manufactured by Charles A. Hones, Inc., 141 South Grand Ave., Baldwin, L. I., N. Y. The expansion has been accomplished to

meet the needs of industry for standard units of higher heat ranges and larger work capacities. Model No. 367236, illustrated, is a still larger, special size furnace with inside work space measuring 36 inches wide by 72 long by 36 high. It attains quick heatups to 2,000 degrees F. with an hourly input of 1½ million B.T.U.'s.

This ruggedly constructed unit has a massive chain drive door for positive action, greater heat retention and safe. easy operation. Higher load strength and wear resistance are achieved with its silicon carbide hearth, and temperature uniformity, economy and operator comfort are assured with full insulating firebrick lining. Six properly proportioned "Buzzer" atmospheric venturi burners—operating without blowers, power or other auxiliariesprovide easy, quiet, rapid and versatile heating capabilities for low carbon steels, preheating high speed steels, heating castings, boxes or fabrications. for precision castings and many other applications. External pilots provide instant, easy and safer lighting.

For more data circle 92 on Postpaid Card



Buzzer 30 Inch Heat Treating Oven Furnace



G. T. Schmidt Model 465 Marking Machine

HORIZONTAL HYDRAULIC MARKING MACHINE

The Model 465 Marking Machine is announced by Geo. T. Schmidt Inc., 1806 West Belle Plaine Ave., Chicago 13, Ill. The Model 465 is equipped with a roller conveyor fixture to mark gear carriers. A wide range of round parts can be individually adapted to mass production marking when this versatile marking machine and GTS custom engineered fixtures are combined as a unit.

Designed as a completely self-contained in line marking station, this Model 465 is conveyor fed and discharged. Parts are positioned into retractable cradle nests by a hydraulic shuttle feed for marking. After positioning, a hydraulically operated die slide, with lettering tool in marking position, rolls the legend into the periphery of metal parts. Since parts are being marked with consecutive serial numbers, each successive number is indexed automatically on the return

stroke of the die slide. The entire marking cycle is completely automatic, and smooth cushioned hydraulic pressure is used. This assures constant controlled marking depth and better impression.

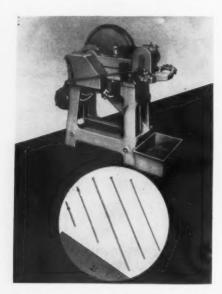
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* modern machine shop

COLD HEADER FOR LONG, THIN PARTS

A cold heading machine, for the mass production of long thin pins, lead wires and similar parts used in the television, radio and electronic industries, is announced by REM Sales Inc., Robert E. Morris Co., 5004 Farmington Ave., West Hartford 7, Conn.

Known as the Morris-Omega Special "0", this new machine can handle wire from 0.020 to 0.090 inch in diameter



The Morris-Omega Cold Heading Machine

and produce headed parts to 23% inches long. Typical samples are illustrated.

This compact machine, which measures only 41 by 20 by 40 inches high, is equipped with 1½ h.p. motor drive and is capable of producing a wide range of parts from 60 to 100 pieces per minute.

Standard features include carefully fitted hardened steel sliding members and many critical components of solid bronze; easily accessible provision for fine adjustment of stroke, tool setting, feed and cut-off; shear pins at critical points to prevent tool damage; and one-shot lubrication system.

For more data circle 94 on Postpaid Card

* modern machine shop

SIX SPINDLE TURRET DRILL GIVES IMPROVED OPERATING PERFORMANCE

Improvements in the design of the transmission and turret spindles of its 1C Turret Drilling Machine are announced by Burgmaster Corp., 15001 South Figueroa St., Box 311, Gardena, Calif. The changes are said to provide a smoother, stronger, trouble-free drive that will improve machine accuracy and finish. Modifications in the transmission utilize an electric clutch for high speeds and an over-running roller clutch for low speeds, arranged in tandem for compactness and simplicity. Power from the drive motor is now transmitted by two timing belts for high-low speed sprocket ratios.

Standard clutch elements automatically shift to supply preset speeds to six spindles in the turret, ranging from 325 to 4,050 r.p.m. Only the spindle in the work position turns and the turret power indexes at operator demand.

Forged turret spindles with integral helical gears substantially increase the strength and rigidity of each spindle, providing a superior mounting for







The Kenco 18 Ton Electro-Safe Press

tooling, a favorable factor for improving accuracy and prolonging tool life. For more data circle 95 on Postpaid Card

* modern machine shop *

PRESS ELIMINATES SAFETY HAZARDS IN HIGH PRODUCTION STAMPING

Electro-Safe Presses, made by Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif., are now built in 5, 8, 12, 15 and 18 ton capacities. Electro-Safe Presses are especially designed for the requirements of high speed production and for most effective use of automatic tooling arrangements. The built-in Electro-Safe Controls are readily interlocked with safety devices which are often desirable in high production. This feature permits the effective use of overload detectors, or other checking devices that monitor proper feeding or sense malfunction during operation.

The Electro-Safe drive has no clutch or flywheel, eliminating all hazards during the loading cycle and permitting instantaneous stopping or starting of the press at any point in the stroke. The operator must depress and hold to the bottom of stroke two widely spaced buttons at the same time to single-trip the press, thus keeping both hands safely occupied. A key-locked selector switch may be set to "continuous," "single trip" or "inch." Locking the selector switch prevents the hazard of inadvertant or unauthorized tampering of the setting required for operation. The rotary cam limit switch can be readily adjusted to automatically stop the press at any point in the stroke, before or after top center. For more data circle 96 on Postpaid Card

* modern machine shop

MACHINE MILLS DRUM CAMS

Ex-Cell-O Corp., Detroit 32, Mich., states that its custom Numera-Trol Cam Milling Machine mills three dimensional contours complete from the solid on fuel metering drum cams. This precision built machine, when used in conjunction with tape control, is capable of machining a wide variety of complex cam configurations.

Lead-Screw Threading and Tapping on GREENLEE AUTOMATICS



Lead-screw threading and tapping attachments for Greenlee Automatics make it easy to thread parts otherwise impractical for automatic bar machine operations. Smooth, precision threading with excellent finish make this type of operation profitable for you.

Look over the threaded products at the right . . . then ask your Greenlee Representative to show you this and other ways Greenlee Automatics can help you beat

rising production costs.





GREENLEE BROS. & CO. 1750 MASON AVENUE ROCKFORD, ILLINOIS

For more data circle 452 on Postpaid Card

✓ MAINTENANCE



Custom Numera-Trol Cam Milling Machine

The work spindle and longitudinal traverse are geared together and driven by a hydraulic servo motor. The cross slide, mounted upon the traverse table, is driven independently by a second servo motor. A standard Ex-Cell-O Precision Spindle supports the cutting tool, the spindle being mounted in a bracket on the cross slide.

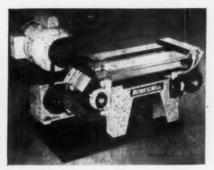
To set the machine in operation, the punched tape is loaded into position in the control cabinet and a camblank loaded in the machine. After adjusting the machine to zero position, the cutting of the cam is entirely automatic, complete instructions being supplied by the tape.

For more data circle 97 on Postpaid Card

* modern machine shop *

AUTOMATIC MILL

Sieburg Industries, Inc., Danbury Industrial Park, Danbury, Conn., announces a new precision machine that applies automation techniques to the high speed production milling of small parts in large quantities. This AutomaticMILL employs a powerful



The AutomaticMILL, shown above, applies automation techniques to high speed production milling of small parts in large quantities.

chain drive to continuously move a matched set of holding fixtures at such variable predetermined speeds beneath the milling cutter that 500 to 6,000 parts are precision machined in a single hour. Hand loading of jaw cavities is most economical for runs of 500 to 500,000 parts, while hopper feeding can be readily installed for larger quantities.

The unique design and closely held machine tolerances allow the AutomaticMILL to perform a wide range of milling operations on varied shaped parts with dimensional accuracies duplicated within 0.001 inch. The unit can be attached to the bed of any milling machine, while a low cost, self-contained unit can be obtained with a "built in" precision milling head.

For more data circle 98 on Postpaid Card

* modern machine shop *

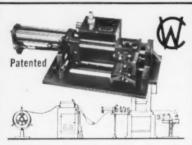
HORIZONTAL BAND SAW

W. F. Wells and Sons, Inc., Three Rivers, Mich., announces a horizontal band saw, designated as the BP-1, which will cut a 21 inch round aluminum billet in ten minutes, according to the manufacturer.

The machine is 107 inches high, 101 side to side and 60 front to back. It

features a variable speed drive from 45 to 1,200 f.p.m. with a 5 h.p. drive motor. Blade size is 22 feet 1 inch by 1½ inches by 0.042 inch. Cutting capacity is 24 inches wide by 36 high.

The machine is equipped with J.I.C. electricals, three intake and three



air operated slide feeds

For increased output and efficiency from your stamping and shearing equipment at low cost. Ideal automatic operation even on short runs, frequent change-overs. Nine sizes, up to 24" feed lengths, for flat or irregular stock to 3/16" thick and 30" wide in lighter gauges. Operates from standard air lines. Self contained.

COOPER WEYMOUTH, INC.

605 Honeyspot Road, Stratford, Conn.

For more data circle 453 on Postpaid Card



BP-1 Horizontal Band Sawing Machine

outlet rollers and is hydraulically operated and fed.

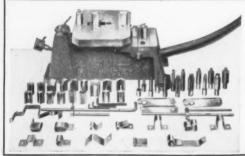
Blade wheel doors are interlocked with the electrical system, so that opening the doors automatically shuts off the machine.

For more data circle 99 on Postpaid Card

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TOOL IS DESIGNED TO LOWER THREAD CUTTING COSTS

A new tool, available from Acme Tool Corp., 73 West Broadway, New York 7, N. Y., has been designed to lower the time required for thread cutting by as much as 40 percent. The



MultiforM

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M Kalamazoo, Mich.

For more data circle 454 on Postpaid Card



Write for bulletin and sample accuracy test sheet.

SHELDON MACHINE CO., INC.

4250 KNOX AVE., CHICAGO, ILL.

SEE US AT ASTE SHOW, DETROIT, APRIL 21-28, BOOTH 1727

For more data circle 455 on Postpaid Card



For the first time you can easily select the right tap for the job. With the NEW Hanson-Whitney Tap Selector, you simply order from your Distributor by catalog number for prompt delivery "off-the-shelt."

Knowing the material to be tapped . . . the Tap, the Gage and the Price are all determined at once.

Trial and error methods are eliminated. You save time, material-waste and tool-breakage. Get your copy of the Tap Selector from your H-W Distributor or write direct. It's free!

THE Hanson-Whitney COMPANY

269 BARTHOLOMEW AVENUE . HARTFORD 2. CONNECTICU

| TABE | PARCE | COMMONDATORS | HOME | ALCO SERVE |
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THE HANSON-WHITNEY COMPANY 269 Bartholomew Avenue, Hartford, Connecticut

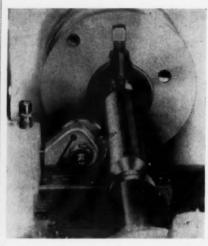
Please send me the new TAP SELECTOR. It's free.

Name _____Title____

Company____

City

new equipment . . .



View of the Acme Thread Cutting Tool

key to this time saving is a cutting disc with a negative profile, which cuts both sides of an individual thread simultaneously. An easily read, easily set scale determines the angular setting of the cutter. Since the chips come off on either side of the thread, the danger of their damaging the thread is eliminated.

Cutters are available in either high speed steel or quality carbide. They are designed for long life and can be easily sharpened without changing the original cutting angle.

The company has a tool for internal thread cutting, as well as external. For more data circle 100 on Postpaid Card



←For more data circle 456 on Postpaid Card

Tired of the same old collets?





For Greater Accuracy and Trouble-free Longer Life!



DRAW-IN COLLETS!

- * Fully Heat Treated
- ★ Ground all over including threads
- ★ Checked 25 times Against Master Gauges
- ★ Selected Collets run dead true at the mouth and within .0002" measured 1" away from mouth
- * Stocked For Immediate Delivery
- * Made in Standard and Special

- Styles for Lathes, Millers, Grinders and Fixtures
- ★ Fractional Round Sizes and Decimal Equivalents from 1/64th to capacity
- ★ Square, Hexagon and Taper holes
- ★ Transparent Packaging for Easy Identification
- ★ Write for Bulletin 100E

RIVETT LATHE & GRINDER, Inc.

MMS-3 Brighton 35, Boston, Massachusetts

For more data circle 457 on Postpaid Card

FILES

American pattern and milled curved tooth files are announced by Victor Saw Works, Inc., Middletown, New York.

Precision cut, scientifically heat treated and individually checked and tested, it is claimed that these files remove more metal with less effort, wear better and stay sharp longer. Both file patterns bear yellow tangs for easy identification.

American pattern files are designed for cutting both hard and soft materials. They can be used for lathe filing, sharpening mill and circular saws and cleaning rough castings. Other files in this pattern are available for cutting soft materials such as lead, babbitt, aluminum, brass and wood. Auto body manufacturers and repairmen find milled curved tooth files

invaluable for use in garages, machine shops, body shops and so on.

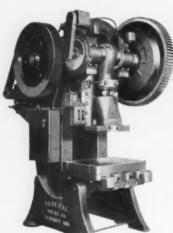
A "self-clearing" feature of the curved tooth files enables each tooth to take a sizable bite out of the work and readily clear itself of chips, resulting in a smooth, scratchfree finish. This is possible because each circular cutting edge is actually a miniature milling cutter.

For more data circle 101 on Postpaid Card



Cost-cutting Automation

-eliminates specialized, more costly equipment!



No. 8 Back-geared type with Federal's newly designed Air Clutch.

Case histories prove that you can step up production many times—cut tooling and production costs substantially with a Federal. Choose from:

AIR CLUTCH PRESSES • DIAL FEED PRESSES • STANDARD PRESSES • SPECIAL PRESSES Federal assures you of the finest workmanship—the best features —Meehanite Iron castings—over-sized crankshafts, Timken bearings, solid, web-type flywheels, symmetrical rams, plus longer "V" ways and gibs.



FEDERAL PRESS COMPANY 604 Division St., Elkhart, Indiana

FEDERAL PRESSES

For more data circle 458 on Postpaid Card



Two New Victor Files

NEW

Manchester --- MILLING ---- CUTTERS

OFFERS . . .

- * CARBIDE INSERTS
- ★ SHEAR CUT ACTION
- ★ MORE

 USEABLE

 CARBIDE
- * IT'S ECONOMICAL
 TO BUY AND
 MAINTAIN
- * QUICK SETTING GAGE INCLUDED

M-50

5" dia. cutter (with 1-1/2" dia. pilot hole) 3, 1/4" wide carbide inserts





♠ M-35

3-1/2" dia. cutter, 1-1/4" dia. shank, 2 carbide inserts 1/4" or 1/4" wide

The new Manchester P.D.Q. Milling Cutters are made of heat treated alloy steel and are designed to handle the "tough jobs". Inserts may be changed in the machine. Exclusive double "V" clamp automatically registers the cutting tools. Designed for low H.P. machines. Special shanks available on request. Write for literature.



M-25

2-1/2" dia. cutter, "4" or 1" dia. shank, 2 carbide inserts "4" or "4" wide



PORTAGE Double-Quick, Inc.

1041 SWEITZER AVENUE . AKRON 11, OHIO

For more data circle 459 on Postpaid Card

TENSION PIN

A pressure-fitting tension pin, designed for faster, lower cost pinning applications, is available from John Gillen Co., 2564 South 50th Ave., Cicero 50, Illlinois.

The Gillen Tension Pin is hollow, with a longitudinal slot, 40 percent lighter than a solid pin; made from special highly elastic spring steel, cold rolled, hardened and tempered. Outside diameters are predetermined larger sizes than the holes to be fitted. The pin compresses as it drives into the hole, and the spring steel exerts pressure on the wall of the hole for a secure and vibration-resisting fit.

Machined chamfered ends simplify



Gillen Pressure-Fitting Tension Pins

insertion. Gillen Tension Pins are available in nominal diameters from 1/16 to 1/2 inch and up, and in lengths as specified. Two tension pins can be combined (one inside another) where there is extra high shear stress or







THE HENRY G. THOMPSON & SON CO.

Saw Blade Specialists for Over 80 Years CHAPEL & WILL STS., NEW HAVEN 5, CONN.

For more data circle 461 on Postpaid Card



73 W. Broadway • New York 7, N. Y.
For more data circle 462 on Postpaid Card



For more data circle 463 on Postpaid Card

new equipment . . .

extra heavy shock load. For such application slots are arranged 90 or 180 degrees apart.

This versatile self-fitting, self-retaining pin is used in appliances, electronic equipment, railroad, construction, automotive and general equipment to lower design and assembly costs. Gillen Tension Pins can be used in such materials as steel, cast iron, light alloys, plastics and porcelain. They eliminate tapping, reaming, milling; and will fit varying hole diameters, as well as out of alignment members. For pinning applications, they replace cotter pins, dowel pins, split pins, set screws, rivets and bolts, Gillen Tension Pins can be removed and reused without loss of temper or tension. For more data circle 102 on Postpaid Card

* modern machine shop *

TOOLMAKERS' MICROSCOPE WITH RESET COUNTERS

Gaertner Scientific Corp., 1275 Wrightwood Ave., Chicago 14, Ill., announces the Gaertner Toolmakers' Microscope that features new reset revolution counters. These counters permit direct reading to three decimal places, with the fourth decimal place appearing on a simplified drum. These counters are available on new Tool-



The Gaertner Toolmakers' Microscope features new reset revolution counters.

BRAND NEW!

SANFORD MG GRINDER and DUST COLLECTOR in a SINGLE COMPACT UNIT

MG GRINDER ALSO AVAILABLE FOR DRY OR WET GRINDING WITHOUT DUST COLLECTOR

The most widely used precision machine for unit grinding. Famous for its unsurpassed workmanship, quality and vibration-less operation. The MG is the grinder that's been "copied" but never equaled.

PARTIAL SPECIFICATIONS

GRINDER: CAPACITY —
8" x 12" x 12". TABLE
TRAVEL — 13", TRAVERSE 8¾". VERTICAL
CLEARANCE — 12" under 7" wheel. STANDARD GRINDING WHEEL
—7" x ½" x 1½" hole.
SPINDLE SPEED — 300
RPM. MOTOR—½ HP,
single or 3 phase TEBB
vnamically balanced.

FLOOR SPACE — 45" x 38". 62" high on floor stand. NET WEIGHT — 600 lbs.

DUST COLLECTOR: BUILT INTO GRINDER FLOOR STAND. EXHAUST CAPA-CITY-650 CFM. MOTOR — ½ HP, 3450 RPM, single or 3 phase. NET WEIGHT — 140 lbs.

COMPLETE DUST COLLECTOR INCORPORATED INTO GRINDER STAND.

- Exclusive design exhaust hood calches.
 all sparks.
- Can be wired to grinder starter.
- Uses standard size filters—renewable or disposable type, on a combination of both.
 - No outside exhaust needed.
 - Saves floor space.
 - Full size rear door gives access for cleanaut.

ANFORD

MANUFACTURING CORP.

1022 Commerce Ave., Union, N. J.

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March, 1960

MODERN MACHINE SHOP

205



TAP BUSHINGS

Drives all standard taps from No. 0 to 1%" and pipe taps from 1%" to 1". Five o.d. sizes.

LESS TAP BREAKAGE LESS TAP WEAR Write for Builetin

BYCO INDUSTRIES

2200 SNELLING AVE., MINNEAPOLIS, MINN.

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REICH — THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.



J. R. REICH MANUFACTURING CO. 201 E. Streep Road Dayton 29, Ohio

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STEVENS—THREE-IN-ONE ROTARY COMPOUND TABLES IN 3 SIZES



COMPOUND TABLE or separated to use individually as Compound table alone and Rotary table alone—all on one investment

The Stevens-Three-in-One will save set-up time and reduce inaccuracies caused by multiple set-ups.

See your dealer or write for bulletins

The John B. Stevens Company
Main Street, Samersville, Conn., U. S. A.

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new equipment . . .

makers' Microscopes and in kit form for installation on instruments already in use

For more data circle 103 on Postpaid Card

modern machine shop *

LINE OF UTILITY VISES

A line of Stanley-Yankee Utility Vises, including swivel tilt and angle vises for production, tooling and maintenance, is announced by The Stanley Works, Stanley Tools Division, 195 Lake St., New Britain, Connecticut.

Designed for quick and accurate milling, drilling, grinding and checking layout work, the swivel tilt vises (Nos. 4992A and 4993A) combine swivel and angle base for compound angle setups. Each vise is extremely useful for toolroom or production work. Dovetail slot and cam lever clamp make it possible for the vise to be instantly adjustable for full length of the dovetail slot, while retaining the swivel feature which makes it easily detachable from the swivel base for machine operation. It can be used as an ordinary vise when lowered to a horizontal position. Jaws have hardened steel face plates for long wear. No. 4992A has a jaw width and opening of 21/4 inches; No. 4993A, 3 inches.

Two angle vises (Nos. 3992A and 3993A) can be adjusted to a full 90





New line of Stanley-Yankee Utility Vises



Workmarking from forming sheet materials in press brakes and punch presses is greatly reduced and in many metals completely eliminated when formed with the Di-Acro Rol-Form Die. Hardened and Precision ground rolls pivot smoothly in the die block to fold material without strain. You save costs by discarding elaborate and time consuming preparation and work methods, reducing polishing time eliminating scrap parts. You also cut costs in press brakes and punch presses by reducing the number of dies needed and reducing set-up time.

One Di-Acro Rol-Form Die with a 60° upper die forms any angle to 60° and any thickness of metal to ½" just by adjusting the ram or bed of the brake. Where ultra-high finish material is to be formed, nylon inserts can be used in the die block to further reduce the possibility of work marks.

The Rol-Form Die is offered in five styles and in lengths from 6 inches to 12 feet for use in all sizes and models of press brakes and punch presses. ስለታልስስ

For ordinary press brake forming ask about Di-Acro Standard Press Brake Dies.



degrees or lowered and used as ordinary vises when lowered to a horizontal position. Accurate graduations indicate the angle which may be quickly and easily locked in position with a thumb screw for quick set and with three hexagon bolts for positive setting. All parts are machined of high quality material. No. 3992A has a jaw

width and opening of 21/4 inches; No. 3993A, 3 inches.

A third model is the swivel vise in two sizes (No. 1992A and No. 1993A). These are dual purpose vises for use on bench or machine. Dovetail slot and cam lever clamp assure positive lock at any angle and permit the vise to be instantly adjustable the full length of the dovetail slot, while retaining the swivel feature. The vise can be quickly and easily removed from the swivel

base for machine operation, without disturbing the setup. No. 1992A has a jaw width and opening of 21/4 inches; No. 1993A, 3 inches. For more data circle 104 on Postpaid Card

AIR CHISEL

Albertson and Co., Inc., Sioux City, Iowa, introduces an air driven chisel, known as the Sioux Slugger. The tool is designed to shear metal, cut metal, cut rivets. drive rivets, scrape metal. break welds. punch sheet metal holes, split nuts, shear bolts, pull pins, drive



The "Sioux Slugger"







ALL STEEL for positive AUTOMATIC PRESSURE CONTROL

The combination of FULFLO Valve design with ALL-STEEL construction is outstanding when you're looking for safe, trouble-free and quiet operation in any hydraulic system.

FULFLO design offers shear-closing action to eliminate chattering; sliding piston for full flow opening; easy adjustment within the pressure range or change of the pressure range.

ALL-STEEL construction adds extra safety, maximum protection against fire or mechanical damage demanded by hydraulic designers and users . . . to the advantages proved by literally thousands of FULFLO all-brass or stainless trimmed valves.

Whatever your requirements . . . for O.E.M. use or replacement service . . . there's a FULFLO Valve designed just right, built right and priced right.

- Screw or flange models . . . to 500 lbs. . . . pipe sizes to 3"
- Steel, cast or brass bodies . . . brass, steel or stainless trim
- Just 6 springs for complete range of pressures
- Fast shipment of standards . . . specials to your requirements

Need a "special"?

FULFLO can engineer a special valve to your most exacting specifications . . . and deliver faster than you may think possible.

FOR COMPLETE INFORMATION.

request a copy of 1960 FULFLO Valves Mechanical Data Book.



THE FULFLO SPECIALTIES CO., INC.

416 Fancy Avenue

Blanchester, Ohio

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bearing races and pressed bearings, and crimp sheet metal, making a strong neat joint. Design features include a one piece barrel without parts to become misaligned or wear; and a cast iron handle to withstand long, rough use. Use of this tool does not create a fire or explosion hazard. For more data circle 105 on Postpaid Card



For more data circle 471 on Postpaid Card



Mayser Electrical Gage speeds inspection

ELECTRICAL GAGES SPEED INSPECTION

For fast, effortless inspection to present-day tolerances and for the employment of automatic devices guided by the gaging results, electricity is successfully used in transforming ordinary mechanical comparator gages into gaging units that indicate the passing of tolerances by flashing lights. Electric limit contacts, built into the gaging unit, will act with a finer discrimination and off-size conditions can be detected within 20 millionths inch accurately and instantly.

In addition to superior accuracy, the electric comparator gage is faster,



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Get further facts and details...
Write for copy of Bulletin L-410.

CRANE PACKING COMPANY

6418 OAKTON STREET

MORTON GROVE, ILLINOIS (Chicago Suburb)
In Canada:
Crane Packing Co., Ltd., Hamilton, Ont.

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MASTER V-BLOCK

HARDENED STEEL

ANGLE PLATES



New design saves hours of setup time. Assures precise work accuracy to .0001.

Also ideal as a master for regrinding worn or inaccurate angleplates.

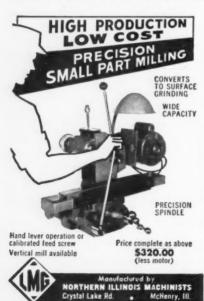


Write for New illustrated catalog on Time Saving Devices

LASSY TOOL CO.

PLAINVILLE, CONNECTICUT

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For more data circle 475 on Postpaid Card

new equipment . . .

since the eye perceives the lighted signal lamps much more quickly. The human reaction to accepting or rejecting a workpiece is much more rapid under the stimulus of the flash of the light, thus making a rapid inspection at closest tolerances. Signal lights report accurately oversize, as well as undersize and correct size, by flashing of green, red or yellow light.

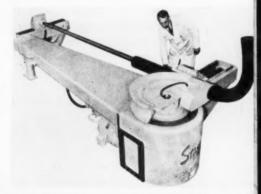
Another very important advantage of electrical gaging is the low initial cost, coupled with the elimination of installation expenses, as well as costly maintenance. A complete line of electrical gaging equipment is manufactured by Mauser. For complete information contact Scherr-Tumico Co., 200 Lafayette St., New York 12, New York.

For more data circle 106 on Postpaid Card

* modern machine shop

HYDRAULIC DRAW BENDING MACHINE

Pedrick Tool and Machine Co., Dept. 5, 3640 North Lawrence St., Philadelphia 40, Pa., offers a new line of hydraulic draw bending machines for bending thin wall conduit and tube.



Pedrick-Staffa Draw Type Bending Machine



THE SPOT!



Here is a fast, accurate gage that has a hundred uses on the production line. It can be used right at the machine, in production, in the inspection department . . . and in the gage laboratory

Simple to use, it requires no special skill on the part of your personnel. It weighs only 3 lbs.

MICROtrol* 170A transistorized gaging system includes a battery-powered amplifier and four types of interchangeable gage heads for use with production comparators, height gages, snap gages, ID or OD gages and similar bench inspection devices. These replace cumbersome and unreliable mechanical or pneumatic elements.



INDICATOR GAGE HEAD gage-stand for surface tion line inspection. plate work.



AGD GAGE HEAD used used with standard height with snap gage for produc-



FRICTIONLESS GAGE **HEAD** used with comparator stand to check production parts.

FEATURES

- . Only 2 control knobs
- . One adjustment zeros both scales
- . Large meter with 4.6" scale
- Dual range-from either ± .0003" to ± .003" or ± .001" to .010"
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- Pocket-sized —5¾" square by 3¼6"
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- . Battery powered -can be used

anywhere

- . AA dry cells can be used in emergency

BASIC GAGES START AT \$341.00

*Trade Mark Contact your nearest Cutler-Hammer office or order direct from



AIRBORNE INSTRUMENTS LABORATORY

DEER PARK, LONG ISLAND, NEW YORK

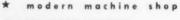
A DIVISION OF CUTLER-HAMMER, INC.

For more data circle 476 on Postpaid Card

The benders, known as Pedrick-Staffa Draw Type Benders, operate with internal mandrels and bend to very close radii.

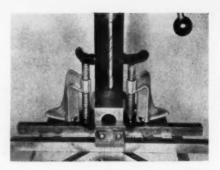
Other features include right and left hand bending with the same tooling, no restriction for minimum size tube, no special foundations for machine, complete machine can be moved without stripping, easy access to all subassemblies for maintenance.

For more data circle 107 on Postpaid Card



CLAMP HOLDS WORK FIRMLY ON ANY SURFACE

A clamp that holds work firmly on any surface, without being limited to positions near the edge, has been added to the "Jorgensen" line of clamping devices, according to Adjust-



The molding-bolt on this Jorgensen Clamp fits into existing holes of the drill press table.

able Clamp Co., 436 North Ashland, Chicago 22, Illinois.

The clamp attaches to any wood or metal work surface by means of a bolt spotted in the middle or along the edge of the work area. Slot in base of clamp engages protruding head of holdingbolt so that clamp slides into work



ATOMIC-ACCURACY in CLOVER ABRASIVES

There is good reason for the lasting quality and uniformity of Clover Coated Abrasives. Each step in their manufacture is controlled by Beta

Ray gauges (nuclear devices) to make absolutely sure they meet Clover's high standards. Result is: Consistent heavy-duty performance on the job.

There is more than luck in Abrasives by Clover

Order from your jobber or write to:

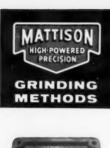
Clover Manufacturing Company

Norwalk, Connecticut

VIctor 7-4515

CLOVER Grinding and Lapping COMPOUNDS

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How would you machine castings like these?



You can grind and save time on a Mattison "No. 153"

Every shop—large or small—can do a variety of jobs at surprisingly low cost on the Mattison No. 153 vertical-spindle disc grinder. In your foundry, on the assembly floor, and right on the production line, there are opportunities to produce better work and increase efficiency with this general-purpose machine.

You can quickly finish large bossed surfaces on doors, covers, and similar parts not requiring high-dimensional accuracy. But even more important, you can pregrind parts which are held on magnetic chucks for milling or finish grinding. The

smooth surface so easily produced by a "No. 153" is a better holding surface and eliminates warpage for more accurate machining.

The Mattison "tub grinder" is built to last, with heavy-duty thrust bearing rated at 25,000 lb. sturdy cast iron wheel dresser head, and 25-hp spindle motor. It has a 53-in. diameter wheel with eight 1" or 2" thick segments, making it easy to handle and replace wheels at minimum cost.

MATTISON MACHINE WORKS
Rockford, Illinois Phone 2-5521

For more data circle 478 on Postpaid Card

MODERN MACHINE SHOP

215

position instantly. When not in use, clamp may be removed, leaving work area unobstructed.

This installation feature makes the clamp quickly adaptable in home, metalworking and woodworking shops for mitering, gluing, routing, sanding, mortising and many other jobs where speedy, sure holding pressure is need-

ed. Installed along the edge of workbench or table, the clamp doubles as a vise.

For either production setups or quick-change operations on drill press or machine table, holding-bolt fits into tee slots or existing holes to hold work solidly.

For more data circle 108 on Postpaid Card

* modern machine shop

PORT SEALS FOR POWER CYLINDERS

Port seals that provide perfect sealing, speedy positioning and complete protection from overtightening damage are now furnished as standard, at no extra cost, on all standard models of air and hydraulic cylinders, boosters and accumulators, manufactured by Flick-Reedy Corp., Miller Fluid Power Division, 7N023 York Rd., Bensenville, Illinois.

The port seals are a device consisting of a hexagonal steel threaded nut with a threaded Teflon sealing insert that is impervious to the chemical or corrosive action of all hydraulic fluids, air, steam, water, gases and practically all chemicals.

To install, the port seal is merely threaded as far as it will go hand-tight onto fitting (or pipe). The fitting is then threaded into the cylinder port at least three turns plus fraction of turn necessary to point fitting in desired direction, and the perfectly sealed and positioned installation is complet-





STEP UP PRODUCTION 20% +

bar stock capacity

Hold delicate parts without damage or adjustment

· Iron grip for heavy work

No adjusting for stock or part variations
 Finger-tip or foot control eliminates operator fatigue

· Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC. 909 40th Ave. NE, Minneapolis 21, Minn.

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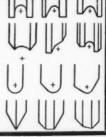
WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Write for Price and Folder.
REPRESENTATIVES WANTED
IN SOME AREAS

JEON MANUFACTURING CO.
P. O. BOX 6750 WASHINGTON 20, D. C.

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ONLY STEWART-WARNER "ELECTRONIC" DYNAMIC BALANCERS

Have weight ranges of 1/4 to 5000 lbs.!

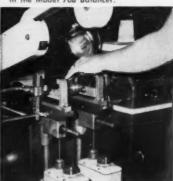
- Balance a wide range of work on the same machine - no special tooling, coupling devices or accessories needed to change jobs!
- Set-up time less than 2 minutes!
- 4 models for use in single-piece, short-run or long-run production quantities!
- · Low initial cost, low operating cost -even smallest shops can afford their own precision balancing equipment!
- Stewart-Warner trains your operator in your plant, on your products!

Stewart-Warner also manufactures a completely portable balancer for in-place precision balancing of all rotating machinery! Write for full details.

STEWART-WARNER BALANCERS Offer these maximum and minimum ranges:



Balancing a 2000-lb, turbine drive gear in the Model 708 Balancer.



Balancing a small rotor to a tolerance of 0.01 in. oz.

| Weight Range | | Diametral Range | Length Range | Sensitivity | |
|-----------------|-----------------|--------------------|-----------------|---------------|--|
| Model 702 | 1/4 lb. to 300 | 1/4" to 30" | 41/4" to 40" | 0.01 inch-oz. | |
| *Model 704 | 1/2 lb. to 1000 | 1/2" to 44" | 41/2" to 55" | 0.01 inch-oz. | |
| *Model 708 | 1 lb. to 5000 | 1" to 68" | 7" to 83" | 0.04 inch-oz. | |

Symbol of

Dept. YY-30, 1850 Diversey Pkwy., Chicago 14, III.

*Various weight and length modifications available upon request STEWART-WARNER CORPORATION



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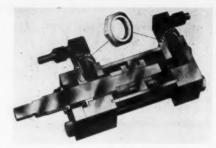


MODERN MACHINE SHOP

Excellence

ed merely by tightening down the port seal against the cylinder port shoulder, using only light to medium wrench torque. The use of pipe dope compounds is completely eliminated.

The company claims that the port seal device has been tested and proven in thousands of field applications in



Port Seals for Miller Power Cylinders

Jump Edge Finder Locates edge to .0003"



Good Deal For Dealers

ELISHA PENNIMAN

Elmwood 10, Conn.

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Information, Methods Ideas and Show How

MACHINE TOOL RECONDITIONING

& the Art of Hand Scraping (4th Printing)
Send for free folder describing illus, book

MACHINE TOOL PUBLICATIONS
215 COMMERCE BLDG. • 324 WABASHA
SAINT PAUL 1, MINNESOTA

For more data circle 483 on Postpaid Card

many industries, even under severe vibration conditions, and particularly when used at ports of pumps, compressors and valves, where overtightening of piping or conventional fittings to obtain correct positioning can cause serious distortion damage.

The port seals are of the pressure sealing type, specified by J.I.C. Standard H622.

For more data circle 109 on Postpaid Card

* modern machine shop

DESIGN OF SELF-ADJUSTING LIVE CENTER INCREASES CAPACITY AND ACCURACY

The precision built live center, produced by J and S Tool Co., Inc., 871 Dorsa Ave., Livingston, N. J., features a simple, six part design. The one piece main body, serving as a cup for the roller bearing on which the spindle

You Need an Extra Hand Now
to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. . URBANA, OHIO

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IN 11 SIZES-No. 6 to 1"

N.C. In all S.A.E. sizes

KALAMAZ00

METAL CUTTING BAND SAW MACHINES

...there's a model to meet your needs



An all new design, first to meet today's metal cutting needs. Embodies years of Kalamazoo experience and the best industrial design talent. Cuts 8" round, 16" flat, 8" pipe. Available with or without coolant equipment.



Where heavy-duty cutting is a problem, you'll find this rugged saw easy to use. Cuts 12" round, 20" flat. Available with or without coolant equipment.



An automatic cut-off machine. \$1485, complete. A low cost, completely automatic operation, job tested and approved for accuracy and efficiency, using low cost carbon blades.



Here's a low-cost saw that heating, plumbing and electrical contractors go for! Easy to move around in the shop or take along to the job. Cuts 6" round and 10" flat. Available with or without coolant equipment.

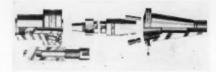
It will pay you to investigate KALAMAZOO. Ask your dealer for a demonstration or write for descriptive literature and name of your nearest dealer.

MACHINE TOOL DIV. Kalamazoo TANK and SILO CO.

360 Harrison St. • Kalamazoo, Michigan
For more data circle 485 on Postpaid Card

turns, permits use of a much greater than normal capacity bearing in a standard size body.

Automatic wear adjustment takes place as the tapered roller bearing moves back when wear occurs. The ball bearing is thus pushed back, retaining concentricity; eliminating eccentricity and bearing failure due



The J and S Self-Adjusting Live Center

to neglect of a manual take-up adjustment. The live center has a concentricity of less than 0.0001 t.i.r. Both

the conical and cylindrical bores of the body are ground at the same setting in the work head. The point is ground under load in its own bearings to insure running dead true The heavy spindle with wide spaced bearing design minimizes deflection.

Guaranteed by the manufacturer for 2,000 hours or one year, the live centers are made in several standard sizes and capacities to meet varying machine shop needs.

For more data circle 110 on Postpaid Card

* mms *
WHEEL
BORING TOOLS

Kendex wheel boring tools with screw-on type round button inserts are announced by Kennametal, Inc..



Knu-Vise stainless steel toggle clamps eliminate frustrating magnetic attraction and corrosion while spot welding, or while working near acids.

The complete stainless steel line contains 18 clamps with either horizontal, vertical, or T-style handles. There are types for side mounting and pull clamps as well. Write today for complete information. A standard or a special Knu-Vise clamp will probably be the answer to your application.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS

LAPEER MANUFACTURING CO.

3048 DAVISON ROAD

WESTERN DIV.: PECK and LEWIS CORPORATION 4436 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7146 CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD. 1131 Pettit Road, Burlington, Ontario

For more data circle 486 on Postpaid Card

Announcing

an important new development for quality control measurement

AMES MODEL AG7

Accu-Flow* Air Gage Recorder

A permanent record of continuous measurements can be made in magnifications of 1750 to 1 – 3500 to 1 – and 17,500 to 1.

The AG7 provides a completely impersonal measurement record that can be used both as a controlling device and as a means of furnishing visible "proof of precision" to buyers of the measured products. Send for free



ACCU-FLOW folder.

*Trademark of B. C. Ames Co.

Representatives in Principal Cities



B.C. AMES CO.

29 Ames Street, Waltham 54, Mass.

Canadian Representative - H. C. Burton Co. Ltd., Hamilton

MANUFACTURERS OF MICROMETER DIAL INDICATORS AND GAGES
For more data circle 487 on Postpaid Card

March, 1960

MODERN MACHINE SHOP

22

Latrobe, Pa. The Style RWR roughing holders fit standard four-tool type "L' boring bars for rough boring.

Standard Style CDH-42 heavy duty Kendex inserts with 1 inch diameter cutting edge can be rotated to a new edge without disturbing the holder



hammers AT ONCE!

It's the NEW, easy, economical, quick why to mold your own lead hammers on a pro-duction basis with "SHUR-GRIP" handles and this COOK production mold Write for circular and prices

COOK LEAD HAMMER SERVICE 67 MASSASOIT AVE., EAST PROVIDENCE, R. I.

For more data circle 488 on Postpaid Card

setting. They can be resharpened easily by grinding the top surface.

Almost all requirements can be met with 11 holders, which are stocked. Inserts are made in two Kennametal grades. Chipbreakers are available. For more data circle 111 on Postpaid Card

modern machine shop

Jorgensen and Pony



the clamp folks

ASK YOUR SUPPLIER. Send for free 32-page catalog.

ADJUSTABLE CLAMP CO. 436 N. Ashland, Chicago 22, III.

For more data circle 489 on Postpaid Card

VALVE-IN-HEAD CYLINDERS

The Allenair Corp., Dept. MMS-1, 255 East Second St., Mineola, N. Y., introduces two new models to its line of Valve-in-Head Cylinders. Both are single acting cylinders featuring a three way solenoid valve built into the rear head, Model AVSA is designed for gravity or air return and Model AVSR features an internal spring to return the rod. All barrels and heads are of brass material. The rods are of



SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled

and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"-plus handy 11/32" size. Length 41/8". ONLY \$19.40. Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

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Polish metallurgical samples

easier, better, more uniform

with



SYNTRON

LAPPING-POLISHING MACHINES

—whether it's one or a number of specimens to be polished, SYNTRON Vibratory Lapping-Polishing Machines will produce a metallographic finish for an electron microscope or brush analyzer examination. Gentle, electromagnetic vibration moves the specimens smoothly around the pan, over abrasive cloth or polishing felt cloth. Abrasive cloths are removable.

SYNTRON Lapping-Polishing Machines are easy to install, easy to operate, easy to maintain.



Write for detailed literature today

SYNTRON COMPANY

309 Lexington Ave.

Homer City, Penna

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ENCO TOOL TURRETS

Boost lathe production, cut costs, reduce tool switching and re-checking, cut set-up time, with ENCO 12-station tool post turrets! Holds 4 maximum size tools 3 working positions each. Sturdy and rigid for hogging cuts, yet unsurpassed for close-tolerance work.



Spring loaded balls locked between perfectly milled spherical seats provide consistent re-indexing accuracy. "On the ball" every time!

There's an ENCO turret for every lathe.

Mail coupon for cat. #53 and name of nearest Enco Franchise Dealer.

ENCO Mfg. Co. 4520 W. Fullerton Chicago 39



ENCO Manufacturing Co. 4520 W. Fullerton, Chicago 39. Dept. 130

Address

Please send catalog #53 and full details of ENCO 12-station tool post turrets.

| tadme" | | |
|--------|--|--|
| Firm | | |

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new equipment . . .



Allenair Model AVSA Valve-in-Head Cylinder

ground and polished stainless steel. Both models are available in all popular voltages and a choice of four mounts is offered, as well as a rod clevis.

For more data circle 112 on Postpaid Card

* modern machine shop

LUBRICANT TESTING MACHINE

A lubricant testing machine, designed for environmental research, is announced by Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

The machine, known as Model LFW-3, can be adapted to testing either dry or liquid lubricants, ambient



Model LFW-3 Lubricant Testing Machine

Check Involute Profiles On Gears From 0-20" Dia.

with a Mahr 890

Error Magnification 500 and 1000 X

A precision-built, highly sensitive instrument, the Mahr 890 Gear Checking Machine checks involute tooth flank profiles on spur and helical gears (both external and internal), bevel gears and worm gears.

Reduced Testing Time—provided by an infinitely variable, optical, base circle setting for gear diameters from 0-20"—with no need for base circle discs.

Accuracy—guaranteed by an extremely sensitive, shock-proof stylus and a recording magnification of 500 and 1000 X. Involute charts can be selected in ratios of 1:1, 2:1 and 4:1. Dust-protected, ball-bearing guides and chromium-plated guide ways assure smooth, low-friction operation.

Range—pitches from DP 1½ to DP 50 can be inspected with standard gaging points. Surface finish can also be checked and recorded easily with a knife-edge gaging point.

Write For More Information

COSA

Importers of Leading Precision Machine Tools
Nationwide Sales and Service

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

In CANADA contact COSA CORPORATION OF CANADA, LTD., 1160 Lakeshore Road, Long Brench, Toronto 14, Onterio
For more data circle 493 on Postpaid Card

Every TOOL ROOM NEEDS THIS BIG REID CATALOG

Send for this 78-page catalog, listing 1600 needed tool room items.



STRAIGHT

holes and faces of hubs are true to rim. Handles and rims are polished to high lustre. Many sizes. Low prices.



Made straight or dished in both solid web or spoked counter balanced types. Fine grain cast iron. Center



COUNTER BALANCED

REID TOOL SUPPLY CO. MUSKEGON HEIGHTS, MICHIGAN

For more data circle 494 on Postpaid Card



Just spot the hole and turn the handle for fast. easy custom tapping. A ruggedly built Dahlstrom Tap Guide taps straight every time—reduces tap breakage. Saves time lost digging out broken tap breakage. Saves time lost digging out broken taps. Fastens to bench or carries to job... Taps big jobs through base... Spindle can tap on lathe or be a tap extension. Comes with 9 adaptors 8-32 to 3/4" (taps not furnished)... 7/4" throat... 8" x 11/4" table... wt. 32 lbs. ORDER NOW—SAVE TAPS AND TIME! Ask for bulletin on the Dahlstrom line of bench tools.

Branch

MANUFACTURING COMPANY 15 Olsen Drive, North Branch, Minn.

For more data circle 495 on Postpaid Card

new equipment . . .

to high temperatures, with oscillatory or rotational motion, over a wide range of velocities and loads. A high temperature furnace is supplied as standard equipment. However, sufficient space has been provided in the specimen area for the future installation of a variety of environmental chambers, such as one for low temperature testing. A 5 h.p. motor allows the machine to operate at friction coefficients of 0.5 at full load.

The Model LFW-3 is furnished complete and ready to operate with all electrical equipment necessary to give full protection against overload and low voltage. Instrumentation is mounted in a separate cabinet, wired for easy connection to, or disconnection from, the testing machine.

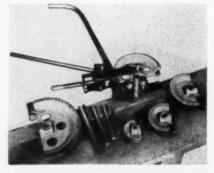
For more data circle 113 on Postpaid Card

modern machine shop

BENCH BENDER

Wallace Supplies Mfg. Co., 1804 West Cornelia Ave., Chicago 13, Ill., announces its T-3 Bench Bender, designed for repair or maintenance work and on-the-job applications.

It has direct lever operation for bending soft copper and aluminum up to 11/2 inches in diameter, and for



The Wallace T-3 Bench Bending Machine

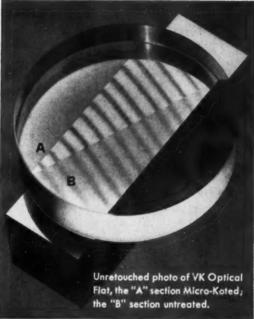
Checking surface flatness down to 1/10 of a band?

It's easy with the

VAN KEUREN

MICRO-KOTED*

OPTICAL FLAT



Elimination of the fuzzy edges of the interference bands gives you greater precision and readability... and faster checking, too, because you get the pattern quicker. There's stronger contrast, a brighter field. The narrow band, very black and sharp-edged, has a width corresponding to a height difference of about .000001".

Originated by Van Keuren in 1957, these Micro-Koted flats are perfect for checking bronze, brass and other metals used for magnetic seals, and for checking other critical parts, for surface flatness.

Write today for descriptive leaflet, "Micro-Koted Flats".

* VK Micro-Koted Optical Flats are treated on one side with a transparent layer of hard metal.



THE Van Keuren co.

175 Waltham Street, Watertown 72, Mass.

PRECISION MEASURING TOOLS
... rated the world's most accurate

Plug Gages - Measuring Wires - Optical Flats and Light Wave Equipment - Gage Blocks - Precision Lapping Service and Parts

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bending annealed steel tubes up to 1 inch o.d. It is especially good for hydraulic line work and copper water line work.

It has ratchet bending action for steel tubes to 1½ inches. The two ratchet dies—1¼ and 1½ inch outside diameter—have cast-in ratchet

teeth with a ratchet lever attachment that provides one man the power of two men. This bench bender uses the "compression" type of bending which gives shorter radii without mandrel use and requires less hand power (rolls the bend in). It can be used for right or left hand bending with tangents of about one tube diameter between bends.

Five complete sets of dies: $\frac{1}{2}$, $\frac{3}{4}$, 1, $\frac{1}{4}$, and $\frac{1}{2}$ inch o.d. Net weight is 117 pounds.

For more data circle 114 on Postpaid Card

★ modern machine shop ★

For Small Precision Work You Need The . . .

LINLEY JIG BORER

The Linley will meet the most exacting requirements and save you money by releasing your larger borers for heavier lobs. It's a precision tool . . . Versatile and flexible: easy to set up and fast operating. Write to receive complete information on the many improvements that are now standard.

Table Size: $7'' \times 17\frac{1}{2}''$ Table Travel: $6\frac{1}{2}'' \times 10''$

LINLEY BROTHERS CO.

661 State St. Ext., Bridgeport 1, Conn.

For more data circle 497 on Postpaid Card

ELECTRONIC GAGING AND CLASSIFYING UNIT

An extremely versatile electronic gaging and classifying unit is announced by Federal Products Corp., 9141 Eddy St., Providence 1, R. I. Designated as the Model 230 M-27, this unit has eight ranges from plus or minus 0.020 to plus or minus 0.0001 inch, four size control limits and five categories.

Model 230 M-27 consists of a voltage regulated vacuum tube amplifier, a four limit classifier, power supply, meter, number display tube and associated circuitry. This is all contained in a single chassis, which can be supplied in a compact cabinet or separately for mounting in a standard 19 inch rack. If desired, the unit can be supplied without the classifier for either laboratory or bench use.



FASTER set-ups and positioning

You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing:* 36" and 50" square or round. *Power rotary* and *power feed:* 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, write for Bulletin 854.

THE CINCINNATI GILBERT MACHINE TOOL COMPANY . CINCINNATI 23, OHIO

For more data circle 498 on Postpaid Card

3 WAYS



20" drill presses to cut costs

Here are three of the many ways you can save money using Walker-Turner "Light Heavyweight" 20" drill presses for drilling and tapping. In standard or special set-ups, these fast, accurate, low-cost tools really pay off in performance. And they offer extra value you appreciate because they're built to last—need little maintenance.

See your Walker-Turner Distributor (listed under "TOOLS" or "MACHINE TOOLS" in the Yellow Pages)—he'll show you the full line of W-T 20", 17", 15" and new 14" Hi-Speed drill presses that can help *you* cut costs.



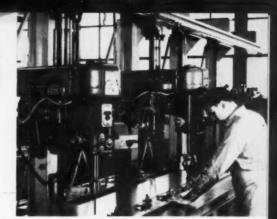
For FREE CATALOG of the complete line W-T metalworking tools, write: Rockwell Manufacturing Co., Walker-Turner Division, Dept. WC-22, 400 N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Co. of Canada, Ltd., Guelph, Ont.

WALKER-TURNER
"LIGHT-HEAVYWEIGHT" MACHINE TOOLS

another fine product by

ROCKWELL

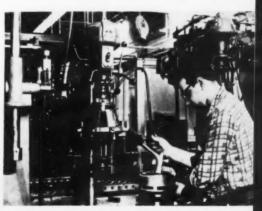




Rail mounted standard components



Carriage mounted special set-up



Equipped with multiple spindle attachment

Any one of the eight ranges can be selected with the panel-mounted switch. A 5 inch precision meter displays the selected range on one of three separate scales which provide a choice of 10, 20 or 50 graduations on either side of zero. The classifier, like



Electronic Gaging and Classifying Unit shown with two styles of gage heads that can be used with it. The one shown at the left has a pantograph-mounted sensitive contact, while the other uses a lever type contact.

"Specialization
Creates Perfection"

Compet RORING TOOLS

(H. S. S. and Carbide) for Holes from 1/16" upward Standard and Special Boring, Facing and Internal Threading Tools. Write for Data.

Bore Small Holes? Contact COMET



For more data circle 549 on Postpaid Card

the amplifier, employs vacuum tubes and printed wiring. It provides five classification categories by means of four adjustable control limits, each terminating in a set of normally open, 10 ampere relay contacts. A panel-mounted "Nixie" display tube indicates the categories by actual number, starting with zero which represents the condition where no limits are actuated.

For more data circle 115 on Postpaid Card

* modern machine shop



GEARS

In Stock—Immediate
Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20
CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, III.

For more data circle 550 on Postpaid Card

LEAD SCREW TAPPING ATTACHMENT

A complete new line of "Auto-Tap" Lead Screw Tapping Attachments is being manufactured by Ettco Tool and Machine Co., Inc., 598 Johnson Ave.,



TOOLSET ® NOTCHING UNITS

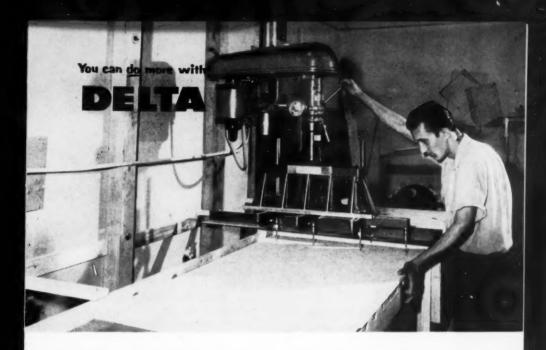
For press brake or punch press operations. Models are available with 5½ inch shut height and 2½ inch die height, or 8¾ inch shut height and 3½ inch die height. Notch capacity up to 5 by 5 inches. Material capacity up to ¼ inch thick mild steel. Special radius or corner notches can be furnished.

Write for catalog or quotation.

TOOLSET, INC.

1411 MILITARY ROAD . BUFFALO 17, N. Y.

For more data circle 551 on Postpaid Card



Costs cut 50% in multiple hole drilling



Delta 17" Drill Press, also 20", 15", 14" and 14" Super-Hi Sensitive. Available in floor, bench and multiple-spindle models.

Suspending a 17" Delta drill press from an angle iron wall bracket doubled productivity at S & S Visual Co., Brooklyn, N.Y. Multiple spindle drill head permits simultaneous drilling of up to 15 holes in wide panels. Versatile, standard Delta components cut drilling costs in half, yet cost less than \$1000.

Every model in the world's most complete drill press line offers extras in power, precision performance and ruggedness. Delta drill presses give you better value for your money—they cost less to buy, operate and maintain.

See 61 Delta machines, 302 models, over 1400 accessories—visit your Delta Industrial Distributor (listed under "TOOLS" or "Machinery" in the Yellow Pages). For FREE catalog, write: Rockwell Manufacturing Company, Delta Power Tool Division, 606-DC N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Co. of Canada, Ltd., Guelph, Ont.

DELTA INDUSTRIAL TOOLS

another fine product by



KWELL

Visit Delta in Booth No. 2046 at the A.S.T.E. Show

For more data circle 552 on Postpaid Card

4 why you Reasons should use GAMMONS DIE REAMERS

Specially treated for today's modern die steels.

Rapid cutting capacity.

Tapers per inch .005, -.008,-.013 in stock.

Large range of standard sizes in stock at all times for your convenience.

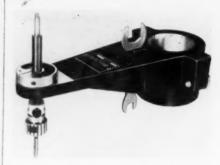
WRITE FOR COMPLETE INFORMATION

GAMMONS • HOAGLUND CO.

CONN. MANCHESTER 2

For more data circle 553 on Postpaid Card

new equipment . . .



"Auto-Tap" Lead Screw Tapping Attachment

Brooklyn 37, New York, The unit, a support arm attachment which fastens to round column drill presses, can be used with any reversing type head to convert the drill press into a precision tapping machine. It enables operators, even with no special skills, to precision tap holes on piece after piece-without danger of thread damage.

This Ettco "Auto-Tap" Lead Screw Tapping Attachment consists of a support arm and support arm clamp, as well as a precision ground lead screw and split nut, both of which are interchangeable to permit tapping of variety of threads.

For more data circle 145 on Postpaid Card

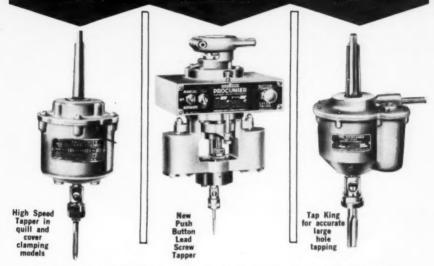
modern machine shop *

TOOL ANALYSER

The increasing need for more accurate control of all cutting tool geometry has prompted Stocker and Yale, Inc., 50 Green St., Marblehead, Mass., to bring out an improved version of its tap analyser.

Originally intended for inspection and qualification of taps, the new model, designated as a Tool Analyser, will accommodate many other small tools including drills, reamers, end mills, broaches, counterbores, hobs and

3 SHORT CUTS to more efficient tapping



You can cut waste, inefficiency, and costs when you use Procunier Tapping Heads. You don't need a slide rule to figure out how! "On the job" production results speak for themselves: Fewer broken taps, less spoiled pieces, more speed, controlled accuracy, minimum rejects and down time, less operator fatigue. It all adds up to better and more production at less cost per topped part.

Procunier heads are scientifically designed to give you the features you want and need in your tapping operations. They offer maximum built-in ruggedness, speed and precision! If tapping costs are getting you down, find out how Procunier can lift you back on the profit track! Send for



PROCUNIER SAFETY CHUCK COMPANY

12 S. CLINTON ST., DEPT. 3 CHICAGO 6, ILL.

| Gentlemen: brochures. | Please | rush | me | your | 2 | free |
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| City | | Zon | | State. | | |

PROCUNIER SAFETY CHUCK CO.

For more data circle 554 on Postpaid Card

so on. Several new features make the instrument more versatile and faster in operation.

Measuring principal incorporates a monocular, zero-paralax optical system with magnifications up to 40x. The tool to be inspected is accurately chucked in relation to index, view angle and the dimensional scales.

Readings to 0.0001 inch may be taken.

An important feature is that all readings are made at one setting, thus eliminating transfer errors. Shank tools are referenced on the shank in the identical manner in which the tool is used. Tool geometry, then, may be related to production results, affording more positive quality control.

The Tool Analyser will accommodate shank diameters from 0.006 to 13/8 inches with standard equipment,

MCROSKY Block-Type **BORING BARS** Many outstanding features • The tapered-V centering key holds the block and cutting blades rigidly producing more pieces-

CROSKY TOOL CORPORATION

A slight release of the key permits "floating" with extreme accuracy for making finishing cuts. Wide range of standard sizes including straight or tapered shank designs, with or without pilots, also special bars to meet any jig, fixture, or work requirement.

better-at lower cost.

MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities For more data circle 555 on Postpaid Card





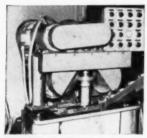


BEFORE BRUSHING-Automotive clutch component . . . with sharp edges plus fine machining chips and burrs still

> AFTER BRUSHING - Edges and surface junctures are uniformly precision blended. Chips and burrs are thoroughly removed to help assure troublefree operation of the installed part.

Precision finish . . . in 7 seconds flat

...capacity 360 parts-per-hour with OSBORN Power Brushing



TWIN POWER BRUSHES deburr and edge-blend these parts on 7-second cycles. Osborn 6" Monitor® Brushes-operating at 1750 rpm -do the job at high production rates. Quality is excellent . . . cost is low.

If you precision finish parts, and want to do the job faster . . . with improved quality . . . at less cost today's Osborn Power Brushing methods can help you

For example—this leading automotive parts manufacturer uses a dual-brush setup to automatically deburr and edge-blend precision clutch parts. In addition to the versatility and precise quality control he's afforded by Osborn Power Brushing-he finds finishing operations are done faster and at significantly lower cost.

It's typical of how you can pinpoint savings, too. An Osborn Brushing Analysis - made in your plant at no cost or obligation - is the first step. Write us for full details. The Osborn Manufacturing Company, Dept. B-27. Cleveland 14, Ohio.

Isborn Brushes

METAL FINISHING MACHINES ... AND METHODS INDUSTRIAL BRUSHES . FOUNDRY PRODUCTION MACHINERY For more data circle 556 on Postpaid Card

and provision has been made to remove the regular chuck head for replacement by special fixturing (vee blocks, center supports, clamps, vises and so on). Thus, the range of the instrument is further increased and tools or workpieces without shanks may also be observed. A full complement of acces-



proofed. Fast delivery from stock!
Cut design time, increase tool room
production and save many manhours by specifying STANDARD
HARCO FIXTURE CLAMPS AND
DETAILS.
Write for free catalog today!

HARCO ENGINEERING 12094 Woodbine Avenue Detroit 39, Michigan

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For more data circle 558 on Postpaid Card



The Stocker and Yale Tool Analyser

sories is available, including collets, chucks, arbors and optics which are interchangeable, so that many tool sizes can be accommodated.

For more data circle 146 on Postpaid Card

* modern machine shop *

ENGINE LATHE

Carroll-Jamieson Machine Tool Co., Dept. 9, Batavia, Ohio, announces a geared head, long bed engine lathe. The C and J Master Model GH Long Bed Lathe is available with either 16 or 18 inch swing and center distances to 132 inches. It is ideal for textile mills, paper mills, maintenance shops and so on. In special cases it can be furnished with center distances to 158 inches.

The 5 h.p. motor is conveniently mounted in the cabinet with multiple

CAMS

MADE TO YOUR SPECIFICATIONS

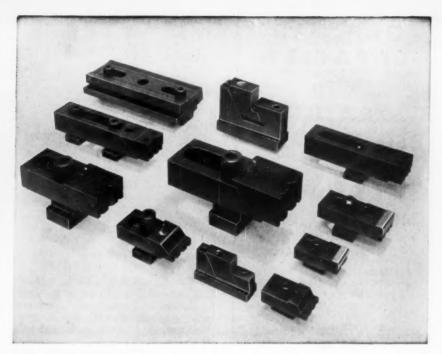
-Except Screw Machine Cams-

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE ROSELAND, N. J.

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Where you can get ...

DOWN-HOLDING DEVICES for any machine table or face plate

J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.

Faster Set-up with any of the 5 Models of I & S Jaw Clamps-one adjusting screw has a holding force of 21/2 tons on the Small Model, to 12 tons on Jumbo Model for positioning and holding the work-piece.

Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

Compact, efficient design of J & S Jaw Clamps eliminates the usual obstruction problems - no interference with measuring tool readings.

See your industrial distributor or write today for free literature.



J & S TOOL CO., INC.

871 DORSA AVE. LIVINGSTON, NEW JERSEY

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GAP BED

with

STRAIGHT BED RIGIDITY

WILLSON

MARK I 13" LATHE

\$1856.00

BEVERLY, MASS.



SOME EXCLUSIVE FEATURES:

MARTON EQUIPMENT, INC.

200 RANTOUL ST. BEVERLY, MASS.

For more data circle 561 on Postpaid Card
238 MODERN MACHINE SHOP

new equipment . . .



Master Model GH Long Bed Engine Lathe

vee belt drive to headstock vee pulley. The all geared headstock is designed for convenience, power and durability with 12 spindle speeds, ranging from 20 to 900 r.p.m., obtained through two speed handles. Accurately ground steel shafts and heat treated alloy steel gears are provided. A standard LO type taper nose spindle, or an optional threaded nose spindle, is mounted in precision Timken taper roller bearings. An improved friction type clutch and brake affords instantaneous spindle control, allowing the motor to run constantly. Lubrication of the headstock is by splash system, the parts running in a constant oil bath. A quick change gearbox is furnished with 48 separate threads and feeds. Threads 3 to 184 per inch are available through the gearbox levers. A quadrant accommodates gears to cut special threads. For more data circle 147 on Postpaid Card

modern machine shop

CARBIDE TOOLS

Besly-Welles Corp., 120 Dearborn Ave., South Beloit, Ill., recently an-



Besly-Welles Tools use Kennametal Carbide

nounced that it is now carrying a full line of carbide single point tools, blanks, inserts and holders using Kennametal material exclusively, in Besly grade designations.

Besly distributors will carry stocks of Besly tools, incorporating Kennametal material, to assure maximum availability throughout the entire country.

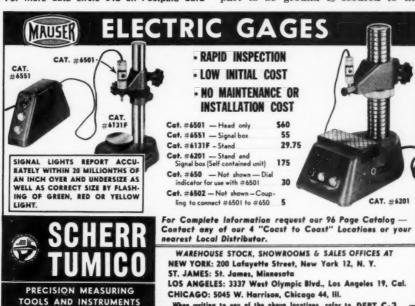
For more data circle 148 on Postpaid Card

DOWN FEED DEVICE FOR SURFACE GRINDERS

Incrematic Down Feed, a new automatic down feed device which permits operator to preset amount of stock to be removed and automatically shuts off after stock removal, is available on all Grand Rapids Saddle Type Surface Grinders from 6 by 18 to 24 by 48 inch table size.

According to the manufacturer, Gallmeyer and Livingston Co., 408 Straight Ave., Southwest, Grand Rapids, Mich., Incrematic Down Feed makes possible complete automatic surface and plunge grinding to extreme repeat accuracy with utmost simplicity. It permits the operator to direct dial the amount of stock to be removed in increments of 0.01 to 0.0001 inch and always leaves 0.0001 inch for finish pass before going into three pass "spark-out", which automatically shuts off machine.

For automatic surface grinding, the part to be ground is secured to the



For more data circle 562 on Postpaid Card

When writing to any of the above locations, refer to DEPT C-3

On display at ASTE Tool Show Detroit Armory, Booth 845, April 21-28



Gaertner 2" x 4" toolmaker's microscope for measurement to 0.0001" and 1 minute of arc

You'll find the Gaertner Toolmaker's Microscope as part of the standard inspection equipment in the ideally-equipped shop or lab. It will do the work of many single-purpose measuring and inspection instruments with greater convenience and accuracy.

Full 2" precision lead screws permit measurements over 2" x 2" of the instrument's range without the use of gage blocks or rods.

Independent and combined rotation of the cross hairs in the protractor ocular speed up measurements and simplify measuring procedure. The instrument's versatility may be increased through the addition of such accessories as thread and radius templates, camera and spotting attachments, fine motion focus, direct-reading counters, and interchangeable optics for varying magnification and field.

Write for Bulletin 147-56

Use Postpaid Card, Circle No. 563 1275 Wrightwood Ave., Chicago 14, III., BU 1-5335

Gaertner SCIENTIFIC CORPORATION

new equipment . . .



Incrematic Down Feed for surface grinders

magnetic chuck or work surface of the machine, and grinding wheel is advanced until it makes contact with work. Then total amount of stock to be removed is preset. Rate of stock removal is selected and surface plunge selector is set so automatic feed receives "feed" impulses at each reversal of the machine saddle. Automatic cycle is set for surface grinding and autofeed start button, is pressed to place feed mechanism in operation.

Automatic plunge grinding is the same except surface plunge selector is placed in "plunge" position. In this position, the automatic feed receives the "feed" impulses at each table reversal.

For more data circle 149 on Postpaid Card

* modern machine shop

POWER PRESS SCRAP CHOPPERS

Cooper Weymouth, Inc., 605 Honeyspot Rd., Stratford, Conn., announces that its improved scrap choppers have been completely re-engineered for



Improved Cooper Weymouth Scrap Chopper

more efficient cutting at increased operating speeds.

These self-contained units chop skeleton scrap as it comes from the press, into a size easily handled and stored for collection. Design and structural improvements have made possible a more positive cutting action, eliminating all side motion of the cutting blades. Even thin hardened material may now be chopped without blade spread. Helicoil inserts and back-up plates on the cutting blades; heavier, stronger main castings all add to the more rugged construction found in all models. They are now made in three sizes with capacities in mild steel from 6 inches by 0.062 to 12 by 0.093. For more data circle 150 on Postpaid Card

* modern machine shop

SOLID CARBIDE BUSHINGS

S and E Machine Products, Inc., Bridgeport, Mich., recently introduced

THE BEST

PORTABLE

ELEVATING TABLE

YOU CAN BUY ... (Eliminates Cranking)



2000 LBS. OR *1000 LBS. CAPACITIES
*ILLUSTRATED

A precision made MIDWEST TABLE Costs no more!

- It's hydraulic . . . positions work or feeds at desired height without use of hands
- Rigid cast construction
- Top turns 360° and clamps
- Foot release valve to lower
- Machined top surface can be used as work table.
- Roller bearing casters with ball bearing swivels
- Floor clamping available extra

Write today . . . specials on request

MIDWEST

114 WEBSTER ST. • DAYTON 2, OHIO For more data circle 564 on Postpaid Card

March, 1960

MODERN MACHINE SHOP

24

Revolutionary New Chuck and Actuator!



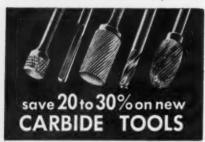
Safe, proven Gamet Air Chuck and Powergrip Chuck Actuator installs easily on your lathe. Saves money—gets results. Makes it possible for you to:

- Use lathe for both bar and chucking work.
- Use the draw tube hole for coolant, or tools.
- Eliminate air leaks and reduce flywheel effect.

Guaranteed for One Year. Chuck Size 41/4" to 14".

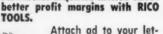
POWER GRIP, INC.

For more data circle 565 on Postpaid Card



RICO has a complete line of:

- Quality rotary carbide & HSS tools
- Available for immediate delivery
- Big savings on new tool costs
- Up to 50% savings on regrinds
- Special tools to specifications
- Distributor inquiries invited about better profit marging with PICO.





terhead for more information.

RICO TOOL CO.
5915 DIXIE HWY. • SAGINAW, MICH.

For more data circle 566 on Postpaid Card

new equipment . . .

a line of solid carbide, bushings, which have been designed particularly for gun drilling applications—where excessive wear, rigid support and alignment are of paramount importance.

Precision gun drilling requires a maximum of 0.0002 clearance and, in many applications, much closer clearances are necessary. These solid carbide bushings are made to exact clearance requirements and hold true to size. The solid-rigid-carbide support also improves cutting tool performance, extends tool life and cuts inspection time, down time and scrap. Both bushing and cutting tool costs are reduced.

Standard solid carbide bushings are offered in a complete range of A.S.A. specifications. Special bushings for gun drilling and other applications are regularly fabricated. The company states that gagemaker tolerances are available on all types,

For more data circle 151 on Postpaid Card



View shows S and E Solid Carbide Bushing

LATHE FEATURES INCLINED BED

Marton Equipment, Inc., 200 Rantoul St., Beverly, Mass., is marketing the Willson Mark I Lathe, which features an inclined bed. It was designed for toolroom, production or research applications. Two models are available, 24 or 36 inch.

The lathe has gap bed capacity with straight bed rigidity. The disposition of weight about the screw and feed takes 10 percent less power for feeds

and screwcutting.

The lathe features all geared headstock; nine speeds, 52-954 r.p.m., forward and reverse; precision taper roller bearings; spindle bore, 1-9/16 inches; L. O. spindle nose, hardened and ground for direct mounting chucks; friction brake; 17½ inch swing for 7½ inches in front of faceplate and 15¾ inch swing for over bed, made possible by unique inclined double inverted vee bed; exceptionally rugged construction; no gap necessary, thereby strengthening the bed. Willson Lathes also have many features for accident prevention.

For more data circle 152 on Postpaid Card

modern machine shop

SMALL DUST COLLECTOR

A compact, low cost, industrial dust collector, suitable for use in any light dust producing operation, is being produced by Torit Manufacturing Co., Dept. 703, 1133 Rankin St., St. Paul 16, Minnesota.

The Model 301 stands only 21½ inches high and occupied a space 12 by 14 inches. Because of its small size, it can be conveniently located on, or under, work benches. The collector is particularly suited to dust control in electronic and other precision production, as well as to any light or occasional manufacturing operation producing dust.

The dust collecting medium in the Model 301 is a highly efficient, fire

A Real Spring Winder!

Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$2.50 No. 2 Capacity 0 thru 3/16" wire \$4.00

No. 3 Capacity 0 thru 5/16" wire \$6.00 HJORTH LATHE & TOOL CO.

10 BEACON STREET WOBURN, MASS.
For more data circle 567 on Postpaid Card

Micro Center Drills & Countersinks

| | Diameter | | Langth | | Price Each | |
|-----|----------|------|--------|---------|------------|-----------|
| No. | Drill | Body | Drill | Overall | Right Hand | Left Hond |
| 00 | 0.020" | 36" | %-" | 1%" | \$1.45 | \$1.70 |
| 01 | 0.025" | 36" | No" | 1%" | 1.20 | 1.50 |
| 0 | 1/32" | 36** | 16a" | 1%" | 1.10 | 1.35 |
| 1 | 3/64" | 36" | %a" | 1%" | .95 | 1.20 |
| 3 | 1/16" | 94" | %2" | 150" | 1.00 | 1.20 |
| 3 | 3/32" | K" | 36" | 2" | 1.00 | 1.30 |

60°HSS Available immediately from stock.

A Tool For The Hard To Do Job

H. KAPP ENGINEERS
66-40 108 St. • Tel: 80 3-8973 • Ferest Hills 75, N.Y.

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ACCURACY of costly machine tools may be ruined using ordinary bolts of soft steel. It is low cost insurance to use Boyar-Schultz precision made T-Slot bolts. Made from heat treated, Alloy steel, heads machined at right angle to shank, to present a broad, flat surface to upper surface of T-slots. Class 3 threads do not strip or distort. For best results use Boyar-Schultz Special Nuts and Washers.

BOYAR-SCHULTZ CORPORATION

2020 S. 25th Ave., Dept. F-B, Broadview, III. For more data circle 569 on Postpaid Card

KELLER DIE FILERS

ECONOMY MODEL \$109.50 STANDARD MODEL

\$131.50 Ask your Keller Dealer or write for Bulletin 256 and Dealer's name.

DELUXE

\$149.50

Quick Acting,

DRILL PRESS VISE

ONLY \$11.50 F.O.B.

Jaws 41/8" wide, 2" deep, open to 41/4". Sets to any angle quickly, saves set-up time. Weighs 161/2 lbs. Ask your dealer or order direct



ervice.

2361 University Ave. St. Paul 14A. Minn. For more data circle 570 on Postpaid Card

LOW COST 5' Magnetic

Sine Bar ONLY \$149.95





WORKING SURFACE ON PERMANENT MAGNETIC CHUCK

Positive tocking provides rigid set-up for light machining operations. End and side plates allow accurate locating of pieces on magnetic chuck making it a versatile, low cost fixture. Ideal for production, inspection or tool room.

OTHER MODELS include 5" and 10" sine bars and plates, single and compound angles, plain and magnetic. Solid oak cases available.

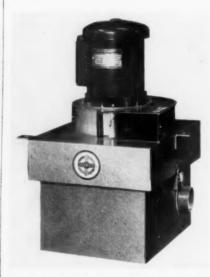


The complete Bald Eagle line starts at \$26.50, F.O.B. St. Paul. Order your sine bar or plate from your dealer or direct.

BALD EAGLE PRODUCTS DIV. 356 Cedar Street, St. Paul 1, Minnesota

For more data circle 571 on Postpaid Card

new equipment . . .



The Torit Model 301 Dust Collector

resistant, throwaway glass filter. Performance ratings under standard test conditions are: 200 c.f.m.; velocity, 4,100; static pressure, 1.7 inch w.g.; inlet, 3 inches. The 301 is equipped with a 1/3 h.p. motor.

For more data circle 153 on Postpaid Card

modern machine shop

HYDRAULIC PRESS BRAKES

A line of hydraulic press brakes, ranging from 200 to 1,000 tons, is being marketed by Niagara Machine and Tool Works, Buffalo 11, N. Y. Identified as Series HD, the machines are available in 44 models to cover a broad span of bending requirements. Bed and ram lengths are from 8 feet 8 inches to 24 feet.

Principal among the features are the following: unitized hydraulic system; rugged hydraulic cylinders, keyed to frame for accurate alignment; unique



Niagara Series HD Hydraulic Press Brake

ram leveling and tilt control, requiring no complex hydraulic or electronic devices; self-aligning ball joints with renewable seats; laminated, nonmetallic ways: deep, rigid bed interlocked to frame; front operated, lower limit, ram adjustment; rugged, deep section steel housings: adjustable top and bottom stroke stops; portable, multi-position foot switch.

For more data circle 154 on Postpaid Card

modern machine shop

GAGE READS BORING AND REAMING TOOL DIAMETERS

A gage for instant, accurate reading of adjustable boring and reaming tool diameters is announced by Muskegon Tool Industries, Inc., Eleventh at Western, Muskegon, Michigan.

Designated the Adjust-O-Matic Gage, it is claimed that this instrument virtually eliminates need for a micrometer in adjusting tool diameters, and permits adjustments to 0.0001 in approximately ten seconds per tool.

The gage consists of a steel holder, in which the tools are placed, and a







effort and money in grinding operations.

Unsurpassed for layout, toolroom and production. Can be used on any machine equipped with magnetic chucks.

COMPARE THESE DISTINCTIVE FEATURES:

- Parallelism: ± .00005" over entire length
- . Maximum setting: 90° angle
- Vernier accuracy: ± 15 seconds
- · Size: 6" long, 41/2" wide, 21/2" high

Write today for complete technical data to:

ANTON MACHINE WORKS 1226 Flushing Ave., Bklyn. 37, N. Y.

For more data circle 573 on Postpaid Card MODERN MACHINE SHOP 245



View of Muskegon Adjust-O-Matic Gage

dial type indicator, graduated in 0.0005 increments. The operator need mike only one tool to establish the desired size, place it in the holder and adjust the indicator to zero reading. Each succeeding tool of the same size is simply placed in the holder and adjusted to the zero reading, thus assuring an accurate setting in seconds.

In adjusting tools of various diameter sizes, the operator uses a micrometer to read the current setting on each tool before placing it in the Adjust-O-Matic. He then expands the tool to the desired size, while reading the amount of adjustment in 0.0005 increments on the indicator face. Indicators graduated in 0.0001 increments are also available.

For more data circle 155 on Postpaid Card

* modern machine shop

AUTOMATIC RECESSING TOOL

A new type of automatic recessing tool, featuring an interchangeable snap-on work pilot adaptor which permits piloting of the tool in the work, as well as in a fixture bushings, is offered by Madison Industries, Inc., Dept. MR11, Box 1137, Providence, Rhode Island.

The work pilot adaptor is normally used on turret lathes, automatic screw machines and other equipment where

WHITNEY-JENSEN MARSHALLTOWN CAM PRESSES

FOR ASSEMBLING

FOR STAKING

FOR PUNCHING

FOR FORMING

FOR SIZING

FOR RIVETING

CAPACITY

THREE THOUSAND POUNDS

DIE SPACE

NO. 101 41/4"

NO. 102 1" TO 14"



NO. 101 MULTIPURPOSE

PRESS NO.



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WHITNEY METAL TOOL COMPANY

720 Forbes St., Rockford, Illinois

For more data circle 574 on Postpaid Card



The Madison Automatic Recessing Tool

the work is rotating. The tool may pilot in a fixture bushing on machines where the spindle is turning.

The new design has only one joint to effect tool accuracy and features a solid, single bar construction which minimizes tool chattering.

The toolholder is a long, solid bar which is claimed to eliminate tool deflection and to permit placement of the cut within close tolerances.

Three basic types of standard tools are made for work diameters from 0.375 to 2.250 inches and a depth of cut up to 0.281 inch. Cutter heads are available to perform a wide variety of intricate operations such as relieving, grooving, forming, backfacing, chamfering, counterboring and necking.

Recessing cutters are made to perform these operations singly or in combinations, thus eliminating complex tooling and permitting the completion of multiple operations in a single pass.

For more data circle 156 on Postpaid Card

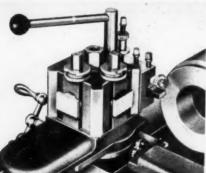
* modern machine shop *

WORK HOLDERS AND CLAMPS

Wales-Strippit, Inc., 207 Buell Rd., Akron, New York, recently introduced a line of work holders and clamps designed for short run welding, soldering and brazing where the cost of permanent jigs is prohibitive.

BON I "THE MASTER QUICK CHANGE TOOLHOLDER"

High Precision Accuracy Guaranteed To .0001"



- 5 Sizes to fit any Lathe
- Quick acting adjustment and tool change
- Tremendously timesaving
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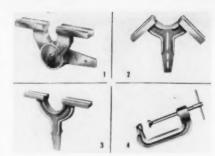
KARL A. NEISE Dept. MM-30, 404 4th Ave

NEISE MODERNTOOIS

New York 16, N.Y. For more data circle 575 on Postpaid Card

Strippit Work Holders and Clamps are used for positioning and holding pipes, rods, tubes, plate bars and other structurals for in-shop or on-the-job joining. The line consists of three different types of holders: (1) Adjustable Holders with clamping faces that can be set at any angle from 0 to 180 degrees by a calibrated dial and single quick opening, quick locking handle; (2) Right Angle Type with clamp faces set at a 90 degree angle for all types of right angle joining; and (3) Straight Type with clamp faces aligned for butt joints. Two of these can be locked together for making tee ioints.

The manufacturer states that all of the holders can be combined to make almost any pattern of two or three way joints and these combinations can be arranged to provide jig type setups.



(1) Strippit Adjustable Holder—clamping faces can be set at any angle from 0 to 180 degrees by a calibrated dial and a single, quick lock handle. (2) Right Angle Type—clamping faces permanently fixed at exact 90 degree angle for all types of right angle joining. (3) Straight Type—with clamping faces aligned to in-line butt joints. Two holders can be locked into position for tee joints. (4) Standard and Quick Acting Clamps—in 4 and 6 inch capacities—standard only in 3 inch. Quick acting types are provided with a trigger for setting or releasing.

Here's Real News for Tool Buyers!



SPECIAL NEW HIGH SPEED CUTTING TOOLS DE-LIVERED TO YOU WITHIN HOURS INSTEAD OF WEEKS



Are you waiting weeks for your new high speed cutting tools such as milling cutters, end mills, reamers, drills, counterbores, etc., to be manufactured? You can eliminate these bottlenecks in your plant by contacting us, Chicago's cutting tool specialists since 1919, for fast service. Our facilities allow us to modify or change most of our stock catalog tools into specials practically overnight and ship to you with a minimum of waiting time. Try us once and be convinced. Send prints or sketches for immediate quotation. Phone or wire us in an emergency. Orders processed at once. Send for free colorful brochure.



CTR SALES & GRINDING CO.

1331 N. HALSTED ST. . MICHIGAN 2-6061 . CHICAGO 22, ILL.









For more data circle 576 on Postpaid Card



The frames of the holders are made of high strength aluminum alloy for easier handling plus faster heat dissipation. All clamping surfaces are precision machined. The aluminum alloy frames also provide permanent resistance to weld spatter.

The clamps are available both in standard and quick acting types in 3, 4 and 6 inch capacities. In addition to their aluminum alloy frames, all steel parts are heavily copper plated

to provide spatter resistance.

For more data circle 157 on Postpaid Card

ULTRA HIGH STRENGTH STEEL

Universal-Cyclops Steel Corp., Bridge-ville, Pa., announces an ultra high strength steel for the aerospace industry. This new steel. Unimach UCX2. was developed specifically for high performance rocket motor cases for missiles. The steel is a modification of AISI 4100 series type steel through the addition of cobalt as an alloving element.

The manufacturer claims that Unimach UCX2 has proved highly reliable for the production of full sized rocket motor cases at

yield strength levels of 225,000 to 235,000 p.s.i. When properly tempered to above strength levels, the new alloy shows essentially no susceptibility to notch sensitivity, one of the prime problems in the production of rocket motor cases. It has proven to have excellent forming characteristics and good weldability, which permits the easy fabrication of these difficult parts. Experience to date with the alloy in the fabrication

Why Mistic Mist is Best!



Model 2RH Mist Coolant Generator

Because it features . . .

- Compact stainless steel nozzle
- Stainless steel covered air and coolant line
- Lead coated tank
- Solid brass, nickel-plated valves
- Multiple outlet availability
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Plus . . . many other outstanding exclusive advantages,

Local distributor service and factory engineering available to help you with your cooling problem. Write today!



AETNA MFG. CO.

199 S. York Rd., Bensenville, Ill.

For more data circle 577 on Postpaid Card

of high performance cases indicates that production costs may be considerably reduced through the use of this alloy. The unusual combination of high strength and good fabricating characteristics has led to Unimach UCX2 being considered for many other structural applications in airborne vehicles.

For more data circle 158 on Postpaid Card

* modern machine shop *

MICRO-MINIATURE MACHINE CUTTING TOOLS

Waltham Precision Instrument Co., Small Tools Division, 221 Crescent St., Waltham 54, Mass., is marketing a complete line of micro-miniature cutting tools.

As typified by the line of taps which go down in size to 0.012 inch in diameter with 338 threads per inch.



Our ability to furnish machine keys of every variety and from a wide range of materials is unsurpassed. Standard gib head keys, ½" taper in 12", are carried in stock in C-1018 Carbon Steel. In addition we can furnish plain taper keys, straight keys, round end feather keys, tit keys and many other varieties, upon request. All keys ore made uniform to exacting tolerances. For your special needs we will gladly quote upon request. Send for new catolog giving complete information on Woodruff keys, taper pins, machine keys and geer rack.

STANDARD STEEL SPECIALTY CO.

FAVER FALLS PENNSYLVANI
Plants: Beaver Falls, Pa., Hammond, Ind.

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Waltham Micro-Miniature Cutting Tools

the Waltham Micro-Miniature Tools will be of great benefit to the manufacturers of precision products, such as instrument and control equipment—and most particularly to those in air and space travel and electronics, where miniaturization of equipment and components is most important. Among

"Donut"-type fluorescent fixtures direct light into work without heat, shadows, obstruction. Wide application...

easy installation . . . free



STANDARD BORING MILL LITE CO.
6771 E. McNichols • DETROIT 12, MICH.

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Unconditionally Guaranteed!

NEW

INSTA HOLD-DOWN CLAMPS "CLAMPS WITHOUT SHIMS"

Holds work securely on: Jig Borers • Planners Punch Presses • Drill Presses • Mills • etc. Write for Bulletin 47-A

Musta clamp

2420 Home Place

Dearborn 8, Michigan

For more data circle 580 on Postpaid Card Morch, 1960 the other tools in the line are spotters, drills, reamers, broaches, countersinks, counterbores, dies, hollow end mills, face mills, lip mills, routing cutters, keyway cutters, fly cutters, poising and circular saws.

For more data circle 159 on Postpaid Card

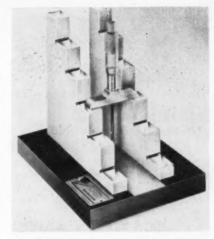
* modern machine shop *

MICROMETER SETTING DEVICE

Size Control Co., 2500 West Washington Blvd., Chicago, Ill., recently announced a new Mikemaster — the Depth-Mikemaster.

The Depth-Mikemaster was created to assure the accuracy of the setting of depth mikes, that rods are properly seated and adjusted and to eliminate scrap that is caused by improper measurements.

The Depth-Mikemaster is constructed of chrome plated hardened steel, with an accuracy of 0.0001 on each step. The range of the Depth-Mike-



Size Control's new Depth-Mikemaster

master is 0.500 to 5.500 inches in six steps. By adding gage blocks to steps, it is possible to determine lead screw





For more data circle 582 on Postpaid Card March, 1960



MODERN MACHINE SHOP

251

accuracy of micrometer and check mike to different sizes.

For more data circle 160 on Postpaid Card

* modern machine shop



For manufacturers with a handling problem involving long bulky or large light loads, Southworth Machine Co., 30 Warren Ave., Portland 2, Maine, announces a new LP Series of scissor type, hydraulic powered lift tables, to simplify lifting, feeding and work positioning of long loads for machine, process or assembly operations.

LP Series models range in capacity from 1,000 to 6,000 pounds; platforms from 38 inches minimum width to 65 inches maximum width; from 7 feet



LP Lift Table has 3,000 pound capacity

minimum length to 16 feet maximum length. Collapsed heights range from 9½ inches minimum to a 12 inch maximum. Vertical platform travel available is up to 40 inches, but where required, Southworth engineers can extend maximum height to 60 inches.

The LP tables have no superstructure whatsoever, and are completely self-contained, thus minimizing acci-



dent hazards. Illustrated is Southworth's LP-3 Lift Table with a 3,000 pound capacity. Platform: 46 by 100 inches, 40 inch stroke, collapsed height, 9½ inches.

For more data circle 161 on Postpaid Card

* modern machine shop

DUAL HEAD MILLER

Barker Engineering Co. Div., The F. Hohlfelder Co., 26470 Lakeland Blvd., Cleveland 32, Ohio, announces its Model PMD Dual Head Mill. This mill was specifically designed and built to meet the need of high production machining of two surfaces simultaneously. Stepped pulleys permit a variation of speeds on the two spindles.

Specifications are: Motors—General Electric, 1/3 h.p. heavy duty, ball bearing, totally enclosed motor; equipped with reversing switch; 1,725 r.p.m., 60 cycles, a.c. dual voltage, single phase, capacitor start; 115/230 volts;



Model PMD Dual Head Mill on pedestal base



PORTABLE HONES

SAVE MANY HOURS IN PRODUCTION, SALVAGE, JOB LOT, MAINTENANCE AND TOOL ROOM

More than 100,000 satisfied users testify to the utility of these "Tools of a Thousand Uses" for internal diameter work in nearly all materials.

Sunnen Portable Hones are guaranteed to produce geometrically round, straight bores—accurate within .0005"—with any desired cross-hatched, lubricant-retaining finish.

Corrects Errors Exact Size Control Controlled Finish

rors Fastest Stock Removal
Control Positive Adjustment
Finish Portable, Yet Rugged
Operates in any Position

Your Sunnen Field Engineer will be glad to help you solve your sizing problems at no obligation to you.

SN-75 Midget Hone Range 1¾" to 2"
JN-95 Junior Hone Range 2" to 2¼"
AN-112 Standard Hone Range 2½" to 7"



For more data circle 585 on Postpaid Card

three phase, 208-220/440 volts; Spindle speeds - standard 1,000-1,725-3,000; nine lower speeds by using optional low speed drive; special motors for still higher or lower speeds; Distance between spindle faces-21/2 inches minimum, 53/4 inches maximum; Top of table to centerline of spindle-13/8 inches minimum, 45% inches maxi-

> That which can always be counted

upon to do what

is expected or

required

mum; Head-heavy, rigid construction, 31/4 inch travel; Table-4 by 12 inch working surface, 1/2 inch tee slot, 5 inch longitudinal travel.

For more data circle 162 on Postpaid Card

modern machine shop

180 AMP WELDER

Placing the convenience of immediate arc welding repair in every metalworking area is the purpose of

the new design 180 amp welder. announced by Lincoln Electric Co., Cleveland 17. Ohio. The company states that the cost of the new welder makes it practical for even the smallest shops to do onthe-spot welding and eliminate the wasted travel and waiting time of outside repairs.

This arc welder is designed especially for convenience and versatility. Dial type control provides easy positive setting of the welder output over a wide amperage range. Electrodes from the smallest to 3/16 inch size can be used to weld materials from 20 gauge to 1/2 inch or thicker plate. The new design has unusually stable arc characteristics and will weld mild steel.

CRATEX BRASIVES

Micro-deburring, Smoothing, Cleaning, Polishing

Cratex reliability lowers costs

You can count on every Cratex item to perform just as you expect it toexactly as the last one did and as the next one will. This is the key to efficiency in micro-deburring, smoothing, cleaning and polishing. YOU SAVE TIME because you know just what to expect in performance without experimenting or compensating. YOU SAVE REJECTS because with Cratex no unexpected irregularities occur to spoil work pieces.

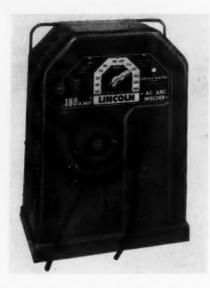


FREE! Send for the complete CRATEX Industrial Catalog today

MANUFACTURING COMPANY, INC. 1600 Rollins Road Burlingame, California



For more data circle 586 on Postpaid Card



Lincoln Electric 180 Amp Arc Welder is designed for on-the-spot welding

low alloy steel and 18-8 type stainless steels. Operation on 220 volt, single phase power supply combined with compact, lightweight construction permits easy movement of the welder to the job, when necessary.

For more data circle 163 on Postpaid Card

* modern machine shop *

SINGLE SPINDLE VERTICAL DRILLING MACHINE

The single spindle vertical drilling machine shown in the illustration is designed with a full range of automatic controls to handle the large variety of second operation drilling, tapping, countersinking, facing, reaming, hollow milling or threading operations on screw machine parts, die castings, stampings, headed or plastic parts. Capacity includes 0.020 to 3% inch drilling in mild steel and up to 3% inch tapping and ½ inch threading. A 34 h.p. spindle motor and drive



pulleys provide a normal speed range between 500 and 10,000 r.p.m. Adjustable spindle feed is obtained with compressed air through a 21/2 inch maximum stroke length by means of intake and exhaust metering screws for both top and bottom of the tandem piston rod assemblies. This is supplemented by hydraulic control adjustment for

break-through or controlled feed operations on any portion of 2 inches of spindle travel.

A top dwell unit provides adjustable pause at the top of the stroke when the unit is operated automatically. This permits time for manual loading or positioning, as desired. A bottom dwell control furnishes additional control for fine surface finishing and holds repeatable depth limits within 0.0005 inch. An extremely simple electrical

> circuit, combining solenoid actuated valve and limit switch application, synchronizes spindle operation with any feasible clamping, positioning, indexing or escapement mechanisms and also allows manual control for

setup or test run. Infinitely variable cycle control ranges up to 500 s.p.m. The speed of operation is determined by the nature of the work being performed. Normal shop line air pressure of 80 to 100 pounds is reduced through built-in regulators to suit requirements. Less than 5 pounds pressure will maintain the spindle operation.

The spindle unit is mounted on heavy, accurately ground, double columns

Eliminate expensive machining and fitting with

NEW HARDENED SPRING STEEL

GILLEN TENSION BUSHES



TYPE OF KEYING AND PINNING DEVICE FOR PRODUCTION ASSEMBLING

STRAIGHT SLOT

Many lengths & diameters Chamfered end for quick & easy insertion Hardened & Tempered WRITE FOR Literature/Sizes/Samples

PIVOTS - BUSHES - TENSION, TAPER, GROOVE & DOWEL PINS - MACHINE KEYS & PARTS Self-Seating Self-Fitting Long Wearing **Economical**



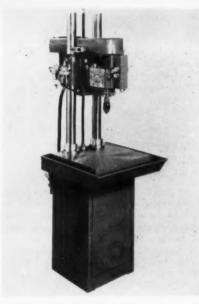
ARROW SLOT



JOHN GILLEN COMPANY

2564 S. 50th Avenue . Cicero 50, Illinois

SUBSIDIARY OF STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY For more data circle 588 on Postpaid Card



Single Spindle Vertical Drilling Machine

and the entire unit can be easily raised or lowered to desired height by means of a center screw adjustment. Minimum distance from spindle nose to table work surface is 0, maximum is 24 inches. Clearance between center line of spindles and columns is 8½ inches.

The table work surface is 18 by 18 inches with ample chip room and oil return trough. An auxiliary surface wear plate is available, if desired. The base cabinet provides leg room for the operator and contains a removable coolant drawer and pump. The tank capacity is 6 gallons.

This machine is a product of Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Illinois,

For more data circle 164 on Postpaid Card

* modern machine shop *

HIGH SPEED HACK SAW BLADES

Silver Streak, a high speed hack saw blade, is announced by Borg-

The best

sheet metal ROLLER LEVELER we've ever built!



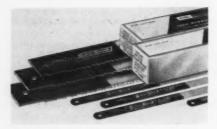
Send for FREE BOOKLET.
Our brochure gives complete specifications and data.
Write for your copy TODAY.

WOEHR ROLLER LEVELERS

(in several standard models)
flatten steel, aluminum, brass and
copper in widths up to 60"
... in gauges .010 to .125! Your
fabricating capacity and efficiency
are increased immediately!
Safe, one-man operation is
simple and accurate.

f.a. WOEHR machine co.

15B FAVOR STREET . ROCHESTER, NEW YORK



Atkins Silver Streak Hack Saw Blades

Warner Corp., Atkins Saw Division, Indianapolis, Indiana.

Atkins claims that Silver Streak Hand and Power Blades offer as much as 50 percent saving in blade cost to the user. Improved metallurgical control of high speed steel is credited with giving Silver Streak Blades a more efficient and more durable cutting edge, which makes this performance possible.

The Silver Streak line is classified as a companion line to the Atkins Silver Steel Tungsten Blades and it is recommended for all production cutting where tungsten blades are not required.

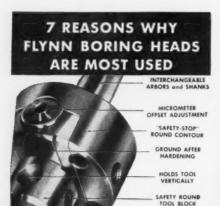
For more data circle 165 on Postpaid Card

modern machine shop

NEW MATERIAL PERMITS DOUBLE SHELF AREA IN SAME SPACE

Up to 100 percent more available shelf space in the same floor area is said to be possible with a new floor grating system, available from Equipto, Aurora, Illinois.

Present shelving can be extended, as the ceiling height permits. Then inexpensive non-skid steel catwalks are installed, with an access stairway. Modular design permits custom fit-





HOLDS TOOL

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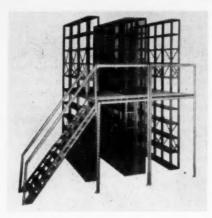


For more data circle 591 on Postpaid Card



For more data circle 592 on Postpaid Card

258 MODERN MACHINE SHOP March, 1960



View shows Equipto Floor Grating System

ting of any installation, while mass produced interchangeable components keep the cost low. The above illustration shows double decked shelving with total height of 14 feet and catwalk at the 7 foot level.

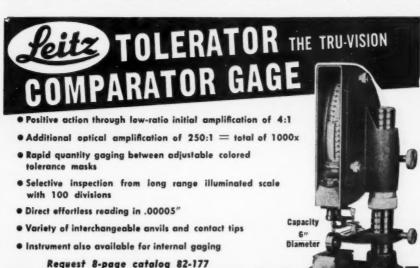
The same components can be used to build a second or mezzanine floor, even where no shelving exists. For more data circle 166 on Postpaid Card

* modern machine shop

SAWING AND FILING MACHINES ARE AVAILABLE IN SIX SIZES

The Rekord Vertical Metal Band Sawing and Filing Machines are announced by Hermes Machine Tool Co., Inc., 48-15 Northern Blvd., Long Island City 1. New York.

The SSF Series is available in four throat depths: $13\frac{1}{2}$ 16, 19 and $37\frac{1}{2}$ inches with maximum work heights of 10, 11, 14 and 16 inches, horsepower of 1.5 to 5.5 and infinitely variable speeds from 50 to 3,800 f.p.m. The 19 and $37\frac{1}{2}$ inch machines also feature



For more data circle 593 on Postpaid Card

137-MM VARICK STREET, NEW YORK 13, N. Y.



Rekord Band Sawing and Filing Machine

a high speed of 7,700 f.p.m. for friction cutting. They take blades from ½ to 1 inch wide. The rigid, cast upright is of attractive, functional design, having the complete drive, work feed, but welding attachment with shears and grinding motor, as well as chip blower, and the wheels of the machine

Cutting speed is regulated by turning the handwheel, and a direct reading in f.p.m. can be taken from the built-in speedometer.

The SM Series is available in two throat depths of 11 and 15 inches with maximum work heights of 6 and 10 inches.

These machines are equipped with a three speed transmission for six cutting speeds; 74 to 558 f.p.m. on the 11 inch and 70 to 480 on the 15 inch machine.

For more data circle 167 on Postpaid Card

Model No. 2

Moto-Tool only \$19.95

Model No. 2 Moto-Tool Kit

with 23 accessories storage case\$



The Dremel Moto-Tool is an indispensable, all-purpose grinder for the tool room—a time-saver for the production line—an industrial favorite since 1936.

Order from Your Supplier or Write for Tool Catalog

DREMEL MFG. CO., Dept. 220-C, Racine, Wisconsin

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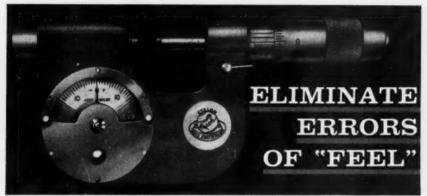
HYDRAULIC CHUCK ACTUATOR

The Gamet Hydraulic Chuck Actuator, a rotating hydraulic cylinder used to operate power chucks, collets and other holding devices on machine tools, is announced by PowerGrip, Inc., Rockfall, Connecticut.

The actuator, which can be operated at pressures up to 500 p.s.i., provides large thrust capacity from a small cylinder. A center hole (up to 3 inches i.d.) permits the user to chuck bar

stock in a power chuck. The four standard sizes provide a thrust of up to 13,500 pounds; thrust capacity of up to 23,000 pounds can be made on special orders.

The hole, which is in the actuator, can be used to hold bar stock or long workpieces, to introduce coolant to the inside diameter of the workpiece, to permit drilling or other machining of the back of the workpiece, or to house a mechanism for the automatic ejection of the finished work.



with the ETALON No. 25

The micrometer that measures and compares visually!

A rugged instrument designed to combine the precision of a dial indicator with the accuracy of the micrometer screw.

- Range 0 to 1".
- Dial graduated in .0001" or .00005".
- · Adjustable anvil pressure.
- To simplify fine adjustment, the dial can be rotated so that the "O" may always be placed under the hand.
- Built-in tolerance hands, individually adjustable: red for undersize, blue for oversize.
- · Tungsten carbide measuring faces.
- One piece hardened stainless steel screw.
- · Retractable anvil.
- · Jewelled and shock proof.
- Also available as No. 25 SD with .080" diameter measuring faces and as No. 25 SR with an extra long anvil.

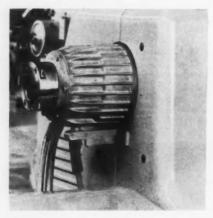


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ALINA CORPORATION

122 East Second Street, Mineola, Long Island, New York

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The Gamet Hydraulic Chuck Actuator

Hydraulic oil is piped to the stationary housing, which surrounds the cylinder. The oil passes into the cylinder through a unique distributor, which permits controlled leakage. The leaking oil passes through and lubricates the roller bearings, then drains back into the tank. The bearings support the housing and maintain the clearance required for controlled leakage, and are not subject to the thrust load created by the cylinder.

For more data circle 116 on Postpaid Card

* modern machine shop

OSCILLATING ELECTROLYTIC GRINDER

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., announces the Model EG-10 Oscillating Electrolytic Grinder, which features a bigger wheel and table for even larger work than previous models.

The company states that its enlarged capacity widens the scope of this new and better method of carbide tool

PAINSTAKING ATTENTION TO DETAIL characterizes SAJO Millers

exemplified by the unsurpassed SAJO spindle construction employing double-row staggered roller bearings and ball thrust bearings — assures utmost stability and smooth transmission of full horsepower to cutter.

Available as
Plain, Universal & Vertical Millers.
Production Millers with automatic
cycling.

No. 2 Universal Miller table size: 52" x 11" 7½ and 1½ HP motors, rapid power traverse.



a austin industrial corporation

76-H Mamaroneck Avenue

White Pigins, New York

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EG-10 Oscillating Electrolytic Grinder

grinding. As with other Hammond Electrolytic Grinders, the effort of

manual tool oscillation is eliminated by the oscillating spindle and diamond wheel consumption is said to be reduced 80 to 90 percent.

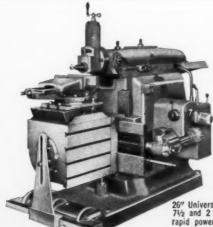
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modern machine shop

MASTER PARALLELS FOR SETTING INTERNAL MEASURING INSTRUMENTS

Master Parallels, announced by Dearborn Gage Co., Ellstrom Standards Div., 22038 Beech St., Dearborn, Mich., are said to provide the most accurate, fastest and easiest means yet devised for setting internal measuring instruments.

To use, simply assemble the gage block combination required to obtain the desired instrument setting-then wring on the Master Parallels. According to the manufacturer, no clamps or holders are required, therefore, no external pressures are introduced to cause distortion and error.



RUGGED DEPENDABILITY keynotes all VMA Shapers

for example:

Unique multi-piston oil pump assures automatic lubrication of all moving parts at pressure up to 400 p.s.i. Built as

Plain and Universal Shapers Production Model 18", 22" and 26" Standard Model 14" to 28"

Also available -**Vertical Shapers** 5" and 12" stroke

26" Universal Shaper 71/2 and 2 HP motors, rapid power traverse.



76-H Mamaroneck Avenue

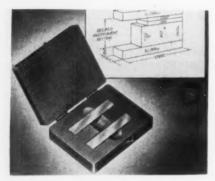
White Plains, New York

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March, 1960

MODERN MACHINE SHOP

263



Elistrom Master Parallels are made of carbide

Made of long wearing carbide, Ellstrom Master Parallels feature an ultra fine precision finish and gaging surfaces which are unconditionally guaranteed for flatness to within 0.000003 inch. They are offered in pairs, furnished complete in special slotted wood case.

For more data circle 118 on Postpaid Card

modern machine shop

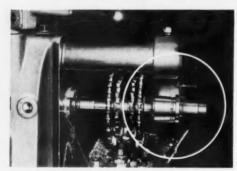
VANADIUM END MILLS FOR HARD ABRASIVE MATERIALS

The DoAll Co., Des Plaines, Ill., announces a standard line of end mills, designed for machining hard abrasive materials Rc 30-40. These tools are made of Vanadium high speed steel.

The company states that prehardened materials, Rc 30-40 and the newer, tough to cut, high strength, high-heat resistant materials can be successfully machined where, in the past, conventional end mills have had a limited life. They also differ from a general purpose type in that they have a specially designed cutting face to provide maximum cutting efficiency on materials of this type.

Vanadium High Speed Steel End Mills are standard in 2, 3, 4 and 6

Replace the bronze bushing in your MILLING MACHINE ARBOR SUPPORT with a Sonnet ROLLER BEARING



Installed in minutes without machine rework. Requires no extra space; no adjustments. Extra sets of bushings provided to accommodate different size arbors. Permits full range of speeds and feeds of late model milling machines. Carbide cutters can be fully utilized.

- · Faster speeds and feeds
- Maximum rigidity
- . No chatter
- · No bearing heating
- . No bearing seizure
- · No bearing seizur
- No twisted arbors
- Longer cutter life
 Utilizes machine's
- lubrication system
- · Increased production
- · Better finishes
- Less maintenance
- · Faster set-ups

Write for catalog!

SONNET

TOOL & MFG. CO. 580 North Prairie Avenue Hawthorne, California

For more data circle 503 on Postpaid Card



DoAll Vanadium High Speed Steel End Mill

flutes from 3/8 through 2 inch diameters. The DoAll Company has also

added four flute center cutting, miniature sizes starting at 1/32 inch in diameter, keyway and large diameters 2 inches and over with Sure-Lock shanks to its end mill line.

For more data circle 119 on Postpaid Card

* modern machine shop

SEMI-FIRM RUBBER CUSHIONED ABRASIVE BINDER

A semi-firm rubber cushioned abrasive binder, known as Brightboy

One of these Wilson "Rockwe instruments will do your hardness testing job

No matter what your hardness testing requirements are, there's a Wilson "Rockwell" tester to do the job. Choose from this complete selection of hardness testing equipment:

"Rockwell" Hardness Tester—for most hardness testing functions.

"Rockwell" Superficial Tester—for extremely shallow indentations.

TwinTester—Combines functions of "Rockwell" and "Rockwell" Superficial testers.

Semi and Fully Automatic—for high-speed testing, at rates up to 1,000 pieces per hour. Automatically classifies pieces as CORRECT, TOO HARD, or TOO SOFT.

Special Machines—for testing large objects, internal readings, and other unusual applications.

Diamond "Brale" Penetrators—Flawless diamonds, individually calibrated, and highest quality construction assure perfect testing every time.



Write for Bulletin RT-58

WILSON "ROCKWELL" HARDNESS TESTERS

Wilson Mechanical Instrument Division American Chain & Cable Company, Inc.

230-G Park Avenue, New York 17, New York For more data circle 504 on Postpaid Card

GB, represents an exceptional development in the compounding of rubber cushioned abrasives, according to Weldon Roberts Rubber Co., Brightboy Industrial Div., 95 North 13th St., Newark 7. New Jersey.

The company further states that the Brightboy GB Binder rounds out what they claim to be the only complete, comprehensive stock line of such

abrasives for multi-use in metalworking and in the finishing of many items in wood, glass, plastics and laminated materials.

With the introduction of the GB semi-firm binder, the Brightboy line now consists of 49 stock compounds. There are now four basic binders: ST, Soft; GB, semi-Firm; BL, firm; and TT, Tough. In each there are six grain sizes from extra coarse to extra fine, and two grain types, silicon car-

bide and aluminum oxide. And there is also Fine Tex. an abrasive compounded of rubber and pumice abrasive. Allitemsare stock and available for immediate delivery. All come in wheels, sticks, rods and blocks for machine and manual operations.

For more data circle 120 on Postpaid Card

★ mms

SMALL HOLE HONING TOOLS

Sunnen Products Co., Dept. E-29, 7924 Manchester Ave., St. Louis 17.



Sunnen Honing Tools



Mo., reports that honing mandrels and stones are now available from stock for bore diameters from 0.100 through 0.118 inch in increments of 0.002 inch. Actual range of each of these mandrels is 0.004 inch; however, for ultra precise work, size of unit to be used should always be within 0.002 inch of the final desired inside diameter.

Manufactured for use with Sunnen Honing Machines, these small mandrels are supplied in both short hole (K Series) and long hole (BL Series) designs. Illustrated are the K3-100CS and BL3-100CS units with stone inserted for the 0.100 to 0.102 inch range. For more data circle 121 on Postpaid Card

* modern machine shop

TOOL TRYOUT FIXTURE FOR FOUR SLIDE MACHINES

A. H. Nilson Machine Co., 627 Bridgeport Ave., Shelton, Conn., announces its No. 00-2 Tool Tryout Fixture for use in the design and



A. H. Nilson No. 00-2 Tool Tryout Fixture

building of tooling for seven models of the Nilson Four Slide Machines.

NEW...BENCH NUMBERING PRESS MODEL 136

This new small, light, compact Press was designed for stamping small Name Plates and small flat articles with up to $\frac{1}{8}$ high characters.

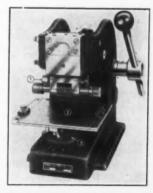
It weighs only 65 lbs. yet has the power and strength of a press much larger in size.

Its compactness and small size, combined with its power, should be very welcome where saving of valuable space and leaving larger power presses free for other work is of importance.

The model 136 is hand operated, using a cam to obtain pressure. The fact that this press has only three moving parts makes it extremely easy to maintain.

Any Numbering Machine, automatic or non-automatic, Typeholders with interchangeable Steel Type, or Special Dies can be operated in this Press.

We also make numbering machines and type.



Write for bulletin MS-136.

NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12, N. Y.

For more data circle 506 on Postpaid Card

The No. 00-2 is mounted on a welded pedestal base, with the standard fixture, consisting of four screwactuated slides operated by a 10 inch diameter handwheel at each slide. There is a center form bracket designed to accept five sizes of center form holders. The tool tryout fixture is supplied with a No. 1 four slide post

> 0003 HOLE LOCATION IN ONE MINUTE Thousands of companies and individuals have proven and accepted our EDGE FINDERS for years. Ask for literature with users list and dealer in your area. Hardened and ground on all surfaces including contours for balance. .500" size \$2.50. Deluxe .200" size \$10.00. Vise stop for holding same hole location in several pieces \$2.95.
>
> Above Postpaid Except C.O.D. Charges

> OPTICAL TANGENT ANGLE & RADIUS DRESSER \$285.00.

1° TO 90° MAGNETIC ANGLE SQ. PIN ANY DIRECTION BLOCK SET, \$198.00. GLOVER MFG. CO **423 PARK AVENUE** MEADVILLE, PA.

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WORKHOLDERS



A basic tool for many uses and with accessories provides many fast setups for production, eliminating the need for single purpose fixtures. Accurate to .0002.

Lassy Work Holders maintain repetitive work alignment and accuracy.



Write for New Illustrated Catalog on Time Saving Devices

LASSY TOOL CO.

PLAINVILLE, CONNECTICUT

For more data circle 508 on Postpaid Card 268 MODERN MACHINE SHOP

and holder, suitable for trying out tooling for No. 1 and No. S-1-F 4-Slides. Also included are forming slides, equipped with toolholder adapters suitable for Four Slide Machines Nos. 0 through S-2-F.

The tool tryout fixture enables the toolmaker to do his tool testing and sample making in the fixture, rather than stopping production on a Four Slide Machine in order to try out his tooling and also make samples.

For more data circle 122 on Postpaid Card

modern machine shop *

FIXTURE FOR KNURLING SHAFTS

A special fixture for knurling the ends of shafts 3/16 inch in diameter and larger is introduced by M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa. A modification of the G-R-D Marking Fixture, this Style K Unit will operate on steel, brass and aluminum. The unit is recommended for knurling shafts for fitting gears, pulleys and wheels.

The Style K G-R-D Knurling Fixture is composed of these basic components: steel housing and base; geared handle; marking roll; "T" handle for fine adjustment of depth of lettering; plus cradle for holding shafts being knurled.

In operation, the shaft is laid on top of a cradle, which includes two wheel-shaped dies for knurling. The mandrel is tightened by screw adjust-

CAMS

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC 23-16 44th Road Long Island City 1. N. Y

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M. E. Cunningham Style K Knurling Fixture

ment, and one revolution of the geared handle completes the knurling. For more data circle 123 on Postpaid Card

* modern machine shop

BIG CAPACITY RADIAL DRILL PRESS

A low cost radial drill press, that is said to offer unequalled capacity and flexibility in its class and price range, was recently introduced by Rockwell Manufacturing Co., Delta Power Tool Division, 606K North Lexington Ave., Pittsburgh 8, Pennsylvania. This Delta Radial Drill Press is designed to drill

to the center, or any point, of a 32 inch square and is claimed to be ideal for rapid multiple drilling operations, horizontal drilling and angular drilling operations.

Capable of doing accurate sanding, shaping, routing, mortising, plug cutting and many other operations, this radial drill press is particularly applicable for pattern, woodworking, furniture shops and for light industry.

SAVE - MONEY - TIME - ENERGY



LEXCO HYDRAULIC LIFT TABLES

Capacities 500# to 10,000#

Portable, adjustable height, Hand or Foot Operated. For lifting and transporting heavy castings, dies. etc.. to machines and Presses.

Also DIE HANDLERS-STRIP STOCK HANDLERS

LEXCO ENGINEERING & MFG. CORP. 20 W. Chestnut St. Souderton, Pa.

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Shown above is Delta Radial Drill Press

This radial drill press features a head that swivels 360 degrees around the column and tilts more than 90 degrees to the right and left. Because the work always remains parallel with the base, every operation can be done safely, easily and accurately.

For more data circle 124 on Postpaid Card

modern machine shop

VARIABLE DEPTH TOOL AND PARTS STORAGE UNIT

The universal problem in trying to arrange an orderly storage system for related tools and parts is the variation in size between them. A unit, announced by American Metal Works, Inc., Bay Products Div., 1825 West Cambria St., Philadelphia 32, Pa., has been designed especially to solve the problem. The shelves vary in depth from 161/2 to 7 inches, so that each part can be kept at the front, easily visible and reached. Bin dividers are also adjust-



A great time, labor and material saver. Fixture taps five holes to every one using the free hand method. Eliminates costly tap breakage. CHECK THESE FEATURES:

- · Articulate arm swings clear of large table for placement of work.
- · Limitless number of sizes of tapped holes without moving work piece.
- · Vise holds work as small as %' square.
- Floating tap lo-cates itself in hole.
- · Individual spindle holds taps, change requires only seconds.



No. 25th Ave. . Melrose Park, III.

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Variable Depth Tool and Parts Storage Unit

able horizontally on 1 inch centers and a full width label-holder is provided for each shelf. Overall cabinet size is 335/8 wide by 17 deep by 341/2 inches high, so that it can be inserted into standard steel shelving. Finish is forest green baked enamel.

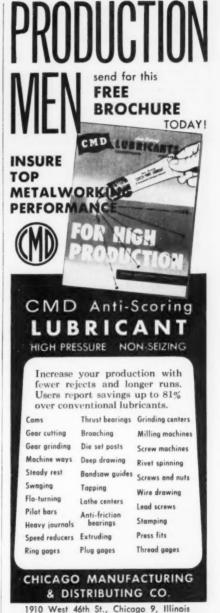
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MOTORIZED DRESSER CUTS DIAMOND WHEEL REPLACEMENT COSTS

modern machine

A self-contained motorized diamond wheel dresser for carbide tool and die production and maintenance is announced by Niagara Cutter Division, Bollier-Damerell, Inc., 332 Niagara St., North Tonawanda, New York.

Important cost savings are made possible through its ability to dress diamond wheels with an absolute minimum of removal and loss of expensive diamond surface. Its motor driven dressing wheels run opposite to, or at an angle to, the rotation of the diamond wheel to obtain fast efficient



271

DURANT HEADED PINS



All tool steel Rockwell C 58/60 — honed finish, no pickup — heads left soft and are guaranteed uniform. Attractively priced at \$12. to \$19. per C. We manufacture 103 and stack 103 sizes for immediate delivery.

Available through our distributor or order direct.

Write for complete prices and details.

DURANT TOOL CO.

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• PIERCING PUNCHES

BUTTON DIES
 STANDARDS · SPECIALS

Also send Blue Prints for Estimates on screw machine products and centerless grinding.

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PORTER MACHINE CO.

30 YRS. SERVING INDUSTRY

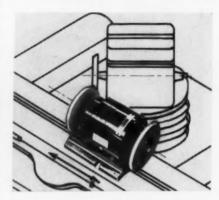
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new equipment . . .



Motorized Diamond Wheel Dresser

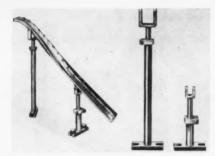
cleaning and dressing of wheels which have become "loaded," out-of-round. off-angle or nicked. Dressing wheels operate at 3,450 r.p.m.-friction driving pressure and hogging are eliminated. Direction of rotation is controlled by simply reversing position of the dresser on machine table. The dresser is mounted on a slotted base which can be held by clamp or magnet to the bed of surface or cutter grinders and accurately fed with feed control of grinder table. Its "kiss" touch and control assures close accuracy and minimum waste of diamond stock. Double end 115 volt, 60 cycles, 1 amp. constant speed, fan cooled motor is equipped with two dressing wheels for convenient location on grinder.

For more data circle 126 on Postpaid Card

* modern machine shop *

STANDARD, PREFABRICATED CHUTE SUPPORT COLUMNS AND YOKES

Syntron Co., 309 Lexington Ave., Homer City, Pa:, announces the availability of standard, prefabricated chute support columns and yokes. They are used to support the gravity feed chutes



Syntron Chute Support Columns and Yokes

between parts feeders and processing machinery—or chutes of a similar construction that need supporting. Vertical adjustment is provided to allow for height variations when installing and the yokes can be rotated a full 360 degrees. The yokes are furnished uniformed, allowing for modification in any way, by bending, cutting, welding, and so on, in order to obtain small or large support areas, as required.

The support columns and yokes are available in a number of sizes which are classified for use with definite parts feeder models or they can be used as desired within the limitations of their dimensions.

For more data circle 127 on Postpaid Card

* modern machine shop

IMPROVED BRANDER WITH TWO LINES FOR TYPE

The improved Acrohex Electric Brander is now available from Acromark Co., 9 Morrell St., Elizabeth 4, N. J., with a two line type holder for interchanging of lettering or numbers. A new kind of holder permits flanged type to be used in a slotted holder with milled undercutting—so the type cannot fall out from heating effects.

Designated as Acrohex Electric Hand Brander No. 321, areas of up to 2 to 4 inches may be branded suc-



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WHAT'S YOUR ENGRAVING PROBLEM



- Need greater speed for engraving light and medium characters . . . use Preis-Panto Model UE or UE-2
- Does work require heavy duty machines... usePreis-PantoModel UE-3.
- Marking metal of extreme hardness, electrical or diamond drag . . . use Preis-Panto UE-M or UM.
- Preparing hardened steel or glass for acid etching ask for Preis-Panto Model UA-M.

Preis is the "one source" solution for your engraving problems. Complete line of accessories and attachments are available for all makes and models.



There's a Model available to solve all your particular problems economically.

PANTO

Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest roomsontative.

H. P. PREIS ENGRAVING MACHINE CO.

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SPEED-BAND°

Capewell's new concept in band saw blades is setting new production records



ON ALL KINDS OF JOBS



ON ALL KINDS OF MATERIALS



OH ALL KINDS OF MACHINES

Ask your Capewell Distributor for the complete story.

Available only from Capewell Distributors





THE CAPEWELL MFG. CO. HARTFORD 2, CONN.

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new equipment . . .



The Improved Acrohex Electric Brander

cessfully, depending upon material. An efficient and well insulated heating element is in each Acrohex Brander for providing sufficient heat to cleanly and sharply brand wood, fiber, plastics, paper and other materials.

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* modern machine shop *

HOT PLATES

A series of hot plates, featuring a newly designed thermostatic control unit that provides close, stepless control of temperature from 10 degrees above ambient to 700 degrees F., is announced by Thermo Electric Mfg. Co., 488 Huff St., Dubuque, Iowa. Type 2200 Hot Plate consists of four models in two sizes, 12 by 12 and 12



View of Type 2200 Thermolyne Hot Plate

by 24 inches, each for either 115 or 230 volt operation.

The bi-metallic thermostat incorporates an Alnico permanent magnet that materially lengthens contact life by aiding in a sure and swift "make and break" of the contacts and by effectively "blowing out" any arc that may form. Temperature stabilizes quickly and initial overshoot is negligible. The thermostat holds any tem-

perature in the hot plate's range within plus or minus 5 degrees F., regardless of wide flunctuation in line voltage or ambient temperature.

The sturdy construction combines sleek styling with design features aimed at focussing heat on the reacting thermostat, yet keeping the case and the rest of the interior cool for protection of hands, table tops and the other circuit components. The cast alumi-



num top plate is ribbed to minimize any tendency toward warpage. Heavy gauge aluminum and perforated stainless steel are used in the case construction. Nickel chromium elements are embedded in high-purity refractory plates, separate from the top plate and easily replaced by the user.

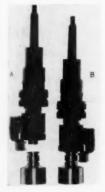
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MECKING CUTTER ATTACHMENT FOR TOOLHOLDERS

A necking cutter attachment, which is designed for its recessing toolholders, makes it easy to machine awkward or irregular shaped workpieces by keeping the work stationary while rotating the tool or vice verse, according to Maxwell Industries, Inc., 493 East Fifth St., Ashtabula, Ohio. Special snap-ring or O-ring grooves, cham-

fering or other external machining can be done in less time with increased accuracy because this necking cutter, combined with its recess toolholder. has adjustable stop collars that regulate the exact location and depth of the tool. Since the toolholders can be supplied with interchangeable shanks, these timesaving oper-





Maxwell Necking Cutter Attachment

JAMESTOWN, NEW YORK
For more data circle 523 on Postpaid Card

ations can be performed on standard drill presses, radial drills, turret lathes or chucking machines, as well as on special machines.

To assure perfect concentricity and to hold location references from above or below the grooves, this attachment has the added advantage of a ball bearing pilot to stop on or fit over the workpiece. This avoids marring of the work surface. Equipped with relatively high feed ratios, it can be used for

manual or mechanical feed with high speed steel or carbide tip cutters.

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MACHINIST VISES

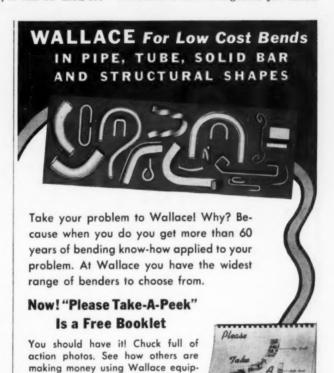
A new series of machinist vises, stronger and heavier by 50 percent at major stress points including handle and swivel locking slide bar, is introduced by Wilton Tool Mfg. Co., Inc., Dept. MMS-129, Schiller Park. Illinois.

The vises were designed in response to requests from machinists for a holding tool that would stand up under the most strenuous conditions of use. In addition to other strengthening, Wilton has made the body of both the swivel and stationary

base models 30 pounds heavier in the 6 inch iaw width size.

Eight vises in the series range in jaw width size from $2\frac{1}{2}$ to 8 inches. Maximum openings in the series range from 3 to 12 inches and throat depth range is 2 to $5\frac{1}{2}$ inches.

All the vises in the series feature permanent grease pack for lifetime lubrication, vibration proof mounting screws, malleable castings and widest selection of interchangeable jaw faces.



Tell us about your problem. Call BUckingham 1-7000 — Collect please.

WALLACE SUPPLIES MFG. CO.

1804 W. Cornelia Ave.

Users comments!

ment. In-plant shots of ram benders,

roll benders and rotary benders. PLUS

GET YOURS TODAY!

Chicago 13, Illinois

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GUARANTEED to cut costs PIN-MOUNT CORE DRILL

ALL NEW TWO-PIECE CORE DRILL

DESIGNED FOR

Accurate Flute Alignment

Greater Flute Depth

Faster Chip Removal

Economy

Standards from ¾" diameter in stock. Specials and carbide tipped cutters to order.

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MFICOI

METAL CUTTING TOOLS INC., Rockford, Illinois

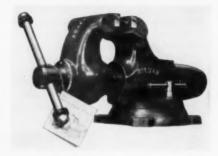
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226 PARK AVE., BELGIUM, WISCONSIN In Milwoukee's Great Industrial Area For more data circle 526 on Postpaid Card

RICE PUMP & MACHINE CO.

new equipment . . .



New Machinist Vise is stronger and heavier

Furnished with each vise are comprehensive, illustrated maintenance instructions and unconditional five year guarantee certificate.

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* modern machine shop

PLANNING KIT FOR VISUAL CONTROL SYSTEM

A kit containing material for planning a graphic visual control for the Boardmaster System is announced by the manufacturer, Graphic Systems,



New Kit designed for Boardmaster System

55 West 42nd St., New York 36, New York.

This new package of visual aid information has many suggestions for picturing facts graphically for production, scheduling, inventory, maintenance, sales and other applications. A collection of 25 tested ideas for tailoring a system to individual requirements is presented in a brochure entitled "How To Plan." Each idea is illustrated with suggested appli-

cations. The 24 page booklet, "Graphic Visual Control," serves as manual and catalog. Over 100 illustrations, some printed in six colors, are used to help explain the system and to picture some typical uses.

A Plan Sheet is furnished for plotting a system on paper. The 17 by 22 inch sheet is a reduced diagram with column alignment of a standard Broadmaster panel. Provision is made for determining flow of information, size and type of cards. color and so on. The sample strip of cards can be used to determine the best visible method of posting data on the board

The Boardmaster is made of aluminum and may be hung on the wall, propped on a desk or anchored on a swinging panel wall bracket with other units. Multiple units may be displayed adjacent to each other on the wall for larger applications. Standard boards are 38½ inches wide by 24 inches high. Weight is 9 pounds. Custom sizes may be supplied. Information is written or typed on cards, which are posted by anchoring their four corners in pre-



cision stamped grooves on the metal board. They snap-in and flip-out with fingertip control.

For more data circle 132 on Postpaid Card

modern machine

CIRCULAR GRADUATING MACHINE

Noble and Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Conn., has added the Model GC Circular Graduating Machine to its line.

The Model GC Circular Graduating Machine accurately and quickly cuts graduations into handwheels, dials, knobs and similar parts commonly used on machinery and instruments. The machine is capable of a wide range and number of possible graduations, including all commonly used



The Model GC Circular Graduatina Machine

English, Metric and "Degree" graduations. The actual cutting of the graduations is performed by a single point tool which produces a clear, sharp line of almost any desired length or combination of lengths.

The machine has a cutting speed of approximately 145 to 180 graduations per minute, according to the indexing cam used. Smallest diameter graduated with standard tooling is 11/2 inches and the largest is 20 inches.

For more data circle 133 on Postpaid Card

SPEED UP DRILLING & TAPPING JOBS!



For cross or end drilling round, hexagon, or square stock or standard or odd-shaped rough castings from 1/4" to 8"

O.D. Will cut tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Jigs available in three sizes 6", 8", 14"; is no points 2", 214", 714". jaw openings 2", 31/4", 71/2".

Write for complete information

HEUSER MANUFACTURING CO

1640 N. Paulina St. Chicago 22, III.

For more data circle 528 on Postpaid Card 280



fewer parts and longer life.

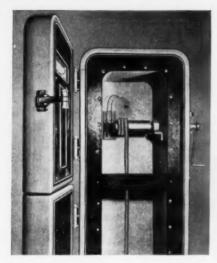
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W.J.SAVAGE CO. TENNESSEE KNOXVILLE

For more data circle 529 on Postpaid Card

MODERN MACHINE SHOP

March, 1960



Environmental Chamber for wire testing

ENVIRONMENTAL CHAMBERS FOR WIRE TESTING

A complete line of environmental chambers, especially designed for testing wire and insulation breakdown in accordance with military specifications, is available from Cincinnati Sub Zero Products, 3930-S-9 Reading Rd., Cincinnati 29, Ohio.

The chambers are constructed so that a mandrel can be installed in the upper part. One end of the wire to be tested is suspended from the mandrel, with the other end hanging free. A specified weight is attached to the free end to exert a force on the wire.

By means of an outside control, the wire is wound on the mandrel without disturbing the test temperature. After winding, the sample is removed and examined for surface cracking and other flaws. This "cold bend" test is used for improving many types of commercial and military wire. The one piece cabinet is constructed of 16



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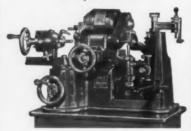
BOX 429-MM

LIBERTYVILLE, ILL.

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Sharpens Chamfers, Flutes and Spiral Points



MODEL 1100

· Capacities No. O Machine Screw to 21/2" Hand Taps

HENRY P. BOGGIS COMPANY

708 E. 163rd St., Cleveland 10, Ohio

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For more data circle 533 on Postpaid Card

new equipment . . .

gauge steel with a 10 gauge steel base for extra strength. Outside dimensions are 84 inches high, 20 inches wide and 42 inches deep. The testing chamber, which is constructed of 14 gauge galvanized steel, measures 12 by 12 by 72 inches.

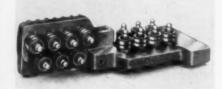
The chamber is lighted, has a Multipane frostproof window 6 inches wide by 12 inches high, and is available with or without a circular to keep inside air recirculating at all times to prevent stratification of warm air. The unit operates on 230 volts and has a temperature adjustment from minus 10 to minus 80 degrees F. Thermal capacity is 200 BTU/hr. at minus 70 degrees F. Other capacities and temperature ranges are available. For more data circle 134 on Postpaid Card

modern machine shop

WIRE STRAIGHTENERS

A series of wire straighteners, featuring adjustable rolls and needle bearings, are offered by The Durant Tool Co., 17 Thurbers Ave., Providence 5. Rhode Island.

Precision engineered for straightening flat or round wire, as well as wire with irregular cross sections, the Durant Straighteners consist of two sets of 5, 7, 9 or 11 grooved rolls set at right angles to remove material curvature on both planes. These rolls can be grooved to the exact diameter of the wire or can be vee grooved for



Durant Straightener for flat or round wire

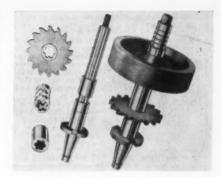
handling a wide range of sizes. Available in five standard and two heavy duty models and designed for use with automatic feeds, these straighteners can be mounted on slide feeds, roll feeds or hitch feeds.

For more data circle 135 on Postpaid Card

* modern machine shop *

SPLINED MILLING ARBORS SPEED MACHINING OF HIGH STRENGTH ALLOYS

A radical improvement in heavy duty milling performance, particularly in the machining of modern, high strength alloys in the hardened state, is claimed for the new splined milling arbors and cutters introduced by Pratt & Whitney Co., Inc., 25 Charter Oak Blvd., West Hartford 1, Connecticut. In this new construction, both the



Splined Milling Cutters and Arbors

arbors and the spacers used with them are splined. As a result, resistance to torsional deflection of the assembly is said to be much greater than that of a plain arbor of the same size. It is claimed that this added resistance to torsional deflection greatly reduces



For 2300° F. add \$95.00 to No. 11 and No. 12, and \$105.00 to No. 12A. No. 12A can be furnished for 3 phase at no additional cost. For floor madel add \$52.00 to above prices. No. 869 standardly supplied for 2200° F.

K. H. HUPPERT CO.

Manufacturers of Electric Furnaces and Ovens

6841 Cottage Grove Ave., Chicago 37, Illinois

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Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and



you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 34" to 34" U.S.S. Inexpensive - Last for years.

Write for Circular DIE COMPANY 17336 Lahser Road Near Grand River Detroit 19, Michigan

For more data circle 535 on Postpaid Card

JIG GRINDING and JIG BORING

to your specification

At your disposal: Our sub-contract jig bering department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N. J. Telephone: ADams 2-7300

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CHICAGO . 13 . ILLINOIS

new equipment . . .

backlash. As a result, very fast cutting is possible and the chatter that causes carbide tips to shatter is virtually eliminated.

The milling cutters used with these arbors are also splined. Precisely positioned on the accurately ground i.d. of the splines, they are driven by the sides of all six splines. As a result, the take-up nut need only be brought up to "hand tight" with a wrench. This, and the fact that the faces of the spacers are precision ground flat and parallel, is said to minimize distortion. increase the positioning accuracy of the cutter itself and greatly increase the accuracy and finish of the milling operation.

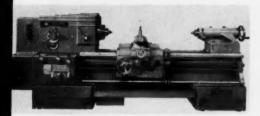
This P & W line includes splined milling arbors, cutters, spacers and flywheels. Both the splined cutters and arbors can be used interchangeably with conventional plain types of the same size. Splined milling arbors, with 50 mm taper, are made in 1, 11/4, 11/2 and 2 inch diameters in standard lengths. Each splined arbor is equipped with a splined anti-friction bearing, which can be positioned anywhere on the arbor's length. Two or more bearings can be used where extra rigidity is desired.

For more data circle 136 on Postpaid Card

modern machine shop *

HEAVY DUTY ENGINE LATHE FEATURES THREE BEARING SPINDLE

The third model in its proven design line of heavy duty lathes was recently announced by Nebel Machine Tool Corp., 3409 Central Pkwy., Cincinnati 25, Ohio. The Model HD 2013 Engine Lathe, which is capable of a wide variety of heavy duty, precision machining, is manufactured to the complete A.S.A. standards and tolerances of accuracy for engine lathes.



The Nebel Model HD 2013 Engine Lathe

A rugged three bearing spindle is featured in the heavy duty design. It is mounted at the front and center supports on zero precision, angular tapered roller type bearings, preloaded and adjusted for maximum radial and thrust loads. At the rear, the third bearing, radial type, provides for longitudinal spindle expansion.

The heavy duty headstock design provides wide-faced, shaved and hardened gears. Selective gear design engages only the gears required for a specific speed. A direct reading color index simplifies selection of 18 gear driven speeds. Up to 20 h.p. is supplied by a constant speed main drive motor by a multiple disc clutch and brake. For more data circle 137 on Postpaid Card

modern machine shop

ELECTRONIC ROTARY INDEXING TABLE

M and M Tool and Mfg. Co., 1123 East Third St., Dayton 2. Ohio, announces the Roto-Spacer, a rotary indexing table for positioning work to perform numerous operations such as assembly drilling, staking and tapping.

A special feature prevents work heads from operating unless index shot pin is in operating position.

The index plunger is designed to locate to 0.001 of true position repeatedly. Index plate is hardened steel. Special screws can be inserted in indexes that are not needed, thus making it possible to work out a com-



For more data circle 538 on Postpaid Card



For more data circle 539 on Postpaid Card

The Universal Cutting Machine PARKS M-2 18" Band Saw Cuts METALS - ALLOYS

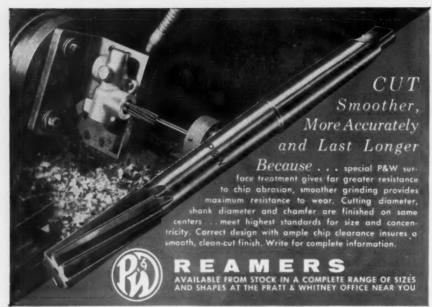
> PLASTICS - WOOD ... and it costs less than \$500!



Here is a rugged. precision-built machine that will cut any materials you work . . . at the speed best suited for that material-from 50 to 4200 F.P.M. Dual-Range, fully variable gear drive. Priced to fit any shop budget. Write for literature on band saws, wood planers, and radial

The PARKS Woodworking Machine Co. 1511 KNOWLTON ST., CINCINNATI 23, OHIO Manufacturers of Quality Machines Since 1887

For more data circle 540 on Postpaid Card



For more data circle 541 on Postpaid Card

bination of indexes to suit the job. The Roto-Spacer 15 inch table is shown using an air operated drill head for second operation parts. Micro switch prevents jamming of tools synchronized with the drill head.

For more data circle 138 on Postpaid Card



Electronic Roto-Spacer Indexing Table

ADJUSTABLE PUNCHES AND DIES OFFER MULTIPLE HOLE PUNCHING IN ONE OPERATION

An adjustable punch and die program, which enables the user to economically punch a number of holes of varying size and shape in one operation and reuse the tooling over and over again, is announced by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City. Minnesota.

Called Di-Acro Adjustable Punches and Dies, the basic elements in this program are specially designed die sets on which punch and die holders can be arranged—by means of a template—into a variety of hole patterns. This adjustable punch and die program can be used for both long and short run production jobs. It has best application where multiple holes are to be punched on a short-run basis, because it saves the time and money involved in punching or drilling holes individ-

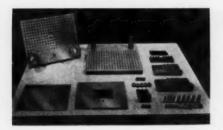


Figure 1—Complete Di-Acro Adjustable Punch and Die Set includes top and bottom plates of die set, punch holders, die holders, punches, dies, socket head cap screws, holddown nuts, locating pilot plugs, material gauges, template and stripper plate.

ually or in having a permanent die made up. Material as thick as 16 gauge mild steel and ½ inch aluminum can be punched to tolerances of plus or minus 0.005 inch.

It was pointed out that two way versatility is possible with the Di-Acro Adjustable Punch and Die program because the setup man has the choice of either setting up the punches and dies outside the press or setting them up with the die set in the press.

"Pegboard" hole pattern of the die sets in the Di-Acro Adjustable Punch and Die program is spaced on ¾ inch centers in both directions, which allow 100 percent overlapping. Holes can be punched anywhere within the area of the die set.

Di-Acro Adjustable Punch and Die Sets are available in two styles; back post type requires minimum press shut height of 6½ inches; center post type requires minimum press shut height of 6¾ inches. Both styles are of steel construction with ball bearing bushings providing negative clearance. All punches and dies used in the Di-Acro Adjustable Punch and Die program are manufactured from chrome alloy steel and are ground concentrically. Punches and dies of similar size are





For more data circle 543 on Postpaid Card

new equipment . . .



Figure 2—Assembled adjustable punch and die set is shown in press. Each die holder has a self-cleaning slug chute, eliminating the need to bore holes in the bolster plate. Additional punches and dies can be added without removing the die set from the press.

interchangeable. Circular locking grooves on the die buttons can be revolved 360 degrees within the die holder. When irregular shapes are to be punched, this feature allows the die to be located radially with reference to the holder.

Standard Di-Acro Punches and Dies include a variety of sizes in rounds, square, rectangular, oval, notching, corner rounding, receptacle, keyhole, electrical outlet knockout and D-shape styles,

For more data circle 139 on Postpaid Card

* modern machine shop *

MARKING MACHINE

Pryor Marking Products, 434 South Wabash Ave., Chicago 5, Ill., announces that the Powermark II is the latest improvement and addition to its line of modern marking equipment.

This machine is made specifically for numbering carbon inter-leaved



Pryor Powermark II Marking Equipment

forms, but can be adapted for other purposes, like coding shop tickets, insurance papers, file cards or file folders and small flat cartons. Powermark II automatically adjusts to go through up to 16 carbon copies. It is available in six to ten wheel capacities. Each wheel is controlled by a separate lever.

Positive inking is guaranteed. Precision construction insures long life on numbering head and printing unit. Two styles of type are available, 3/16 inch Gothic or Roman.

* modern machine shop

AUTO-COLLIMATOR AVAILABLE WITH PHOTO-ELECTRIC UNIT

Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill., announces that the Microptic Auto-Collimator, reading to 0.1 second of arc, has been improved with a photoelectric system that eliminates the need for repeated observation through the eyepiece when making exact set-



For more data circle 544 on Postpaid Card



Photo-Electric Microptic Auto-Collimator

tings. It can be used wherever the visual instrument has been applied for precise testing of angles, circular divisions, straightness, flatness and general alignment.

The electronic read-out, operated from a photo-electric cell at the instru-

ment's eyepiece, provides display on the meter of a small self-contained unit. The meter zero can be set and its sensitivity adjusted to fit practically all operating conditions.

This instrument is of particular advantage in reducing operating time and increasing accuracy and convenience of reading series of tests as in the checking of gears, dividing heads, rotary tables and circular spacing—or where reference mirrors are used to test stability, repetition, expansion or other delicate mechanical movements. For more data circle 141 on Postpaid Card

* modern machine shop

VERSATILITY IS KEYNOTE OF UNIVERSAL GRINDING AND CUTTING OIL

Said to be almost an all-purpose cutting and grinding oil, usable either straight or blended, a versatile new coolant is announced by Michigan

New RADITURN



CUTS ANY RADIUS

Convex, Concave or Ball

Patented

The eccurate short cut for turning any radius.

Adaptable to most any lathe.

Contact your tool supplier or write for details.

RETCO MFG. & SALES
2115 N. Delaware St. • Indianapolis 2, Ind.

For more data circle 545 on Postpaid Card
290 MODERN MACHINE SHOP

MUMMERT-DIXON FACINGHEADS

Two-way tool feed in 9, 12, 16, 20, 24 30, 36, 40 and 46 sizes.

One-way tool feed in 6, 9 and 12 sizes. Automatic feed — convenient tool adjustment — quick feed reverse. Save time and costly setups.

Write for folder.

MUMMERT-DIXON CO.

For more data circle 546 on Postpaid Card

March, 1960

Tool Co., Shear-Speed Chemical Products Div., 7171 East McNichols Rd., Detroit 12, Mich. Called Shear-Speed H-101, it has an adequate blend of saponifiables, sulphur and chlorine, heavy in E.P. value. Thus, it may also be used as an additive to increase E.P. characteristics of general purpose cutting oils. The company states that it has proved to be quite satisfactory on a wide range of operations, used either straight or

tures include: reduce grinding costs; finish grind or resharpen in two minutes; does not require setting or adjustment; does not require an experienced operator; 60 and 7 degree relief angle incorporated into fixture; eliminates poor thread form; eliminates improper clearance angle; improves thread finish; grind angles to within 5 minute tolerance; capacity—to ¾ by ¾ tool; material—normalized

blended

With its excellent wetability, H-101 provides a good surface finish on the machining of high alloy materials, such as stainless steel, monel metal and jet engine alloys. H-101 is made with special care to assure freedom from bacteria.

For more data circle 142 on Postpaid Card

GRINDING

Cavic Eng. Co., 1313 West Essex Ave., Kirkwood 22, Mo., is marketing a threading tool grinding fixture. Fea-



Cavic Threading Tool Grinding Fixture

Why suffer rejects . . . needlessly?

Replace guesswork gaging with "honest-tenth knowledge" and

WATCH



GO



DOWN!

COMTORPLUG

- . Tells operator actual hole size to fraction of .0001".
- Shows him front or back taper, barrel shape, bell mouth, ovality, etc.
- Unique patented expanding plug principle gives uniformly accurate 2-point gaging, automatically aligned, centered and pressured.

Because it makes the operator "master of tenths," Comtorplug is now the production control gage in hundreds of fast-moving programs: jet engine, household appliance, automotive transmission, high-speed machinery, etc.

COMTORPLUG

For more data circle 547 on Postpaid Card



MODERN MACHINE SHOP

291

gray iron casting; size, 2 by 23/4 by 35/8; weight, 23/4 pounds.

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* modern machine shop

OVERSPEED SAFETY DEVICE ADDED TO PNEUMATIC GRINDERS

An overspeed safety device with an anti-defeat feature has been incor-

porated in pneumatic grinders made by Thomas C. Wilson, Inc., 21-11 Forty-Fourth Ave., Long Island City 1, N. Y. The device is standard on all Wilson Grinders with rated speeds of 7,200 r.p.m. or less, to supplement the governor which normally controls wheel speed. If the governor becomes inoperative for any reason, such as improper adjustment or dirty air, the device functions to protect personnel from dangerous wheel speeds. It

> is not needed on grinders with rated speeds above 7,200 r.p.m. since, if their governors should fail, their free speeds are safely below wheel proof

speeds.

The device has a simple positive snap action which cuts off air to the motor before normal governed speed is exceeded by a safe margin. Air remains off until the device is reset. Resetting requires removal of the throttle handle. which gives access to the governor, as well as the safety device. This provision guards against defeat of the safety device by keeping a grinder in service without restoring the governor to normal operation.

The device is independent of



the governor and is not subject to wear, since it functions only if rated speed is exceeded. It does not alter the compact, lightweight design of Wilson Grinders, and may be added to Wilson equipment now in service. For more data circle 144 on Postpaid Card

modern machine shop

150 POUND VIBRATION FATIGUE TESTERS ARE IMPROVED

Two versions of an improved vibration fatigue testing machine, in which a vertical table movement is controlled entirely by a piston operated mechanism, are announced by All American Tool & Mfg. Co., 8043 Lawndale Ave., Skokie, Ill. They are Models 150 VP-D and 150 VP-T. Table load capacity is 150 pounds at 10 g.'s of acceleration. For gravity values higher than 10, the load must be reduced. Maximum capacity is approximately 23 g. Vibration is produced in simple harmonic motion.

Acceleration and deceleration are regulated by the range selector, an automatic frequency control device. On Model 150 VP-D, starting at 10 cycles per second, frequency may be increased uniformly to 60 c.p.s. (600 to 3,600 vibrations per minute). On Model 150 VP-T the available range is from 5 to 100 c.p.s. (300 to 6,000 vibrations per minute). Any range of frequencies within this total range may be used. Range selector can be



All American Vibration Fatigue Tester

FURNACE HEAT TREATING

The Series 8055 is two electric heat treating furnaces (Hardening 2,000° F. and 2,300 F., and Drawing 800° F. and 1,250° F.) in the floor space of one furnace. Each furnace is independently controlled permitting hardening and drawing operations to be performed at the same time. All models are delivered with separate controls for each furnace. The 8055 series is made in nine standard sizes . . , other models are made to your specifications. Furnaces operate on standard line voltage . . . no transformer necessary. A hardening and preheating combination is also available.

Write for a free catalog of the entire Lucifer line. Engineering advice is offered without obligation. Write, wire or call . . .

LUCIFER FURNACES, INC. NESHAMINY 6, PA.

SPACE-SAVER Phone: Dlamond 3-0411

COMBINATION

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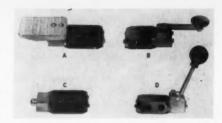
cut out and frequencies held at any desired point within the available range. Frequencies can also be changed manually.

For more data circle 168 on Postpaid Card

* modern machine shop *

VALVE LINE OFFERS GREATER MOUNTING FLEXIBILITY AND LONG SERVICE LIFE

A line of "Rotoram" 3 and 4 way valves, incorporating a new concept in valve engineering—a stem which has a reciprocating and rotating motion during actuation—is announced by Air-Mite Devices, Inc., 4401 West Kinzie St., Chicago, Ill. The stem's 2 way motion is designed to provide fast, smooth control of air cylinder applications. A special "Block V" packing permits free movement of the stem, yet



(A)—3 and 4 way pedal valve, (B)—3 and 4 way finger valve, (C)—3 and 4 way cam valve and (D)—3 and 4 way hand ball valve.

maintains tight sealing to eliminate air leakage. The valves are made for $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch pipe sizes and are designed for operating pressure to 200 p.s.i. Port entry is from either left or right side.

Large air passages machined in the body of the valves, which are made of 2024 T4 aluminum bar stock, insure maximum air flow and quick cylinder response. The universal design and

MANY HOLES FROM 1 SET UP MAN WITH A ROM 1 SET UP JOHANSSON RADIAL DRILL

Move the drill, not the work. Slides, elevates and rotates for quick and easy hole location.

8-speed gear drive. Proper speeds instantly—change while machine is running.

Large or small work pieces handled with ease —drill head swings 360° allowing work to be placed on front table or rear platform.

Drilling capacity 1 3/4 "

Spindle taper Morse No. 4

Spindle speeds (8) Various Ranges

Spindle to col. (max.) 36"

Spindle to work surf. (max.) . . . 53"



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I. O. JOHANSSON CO. 7240 St. Louis Avenue

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low silhouette permits use in a wide variety of mounting positions and actuating methods.

For more data circle 169 on Postpaid Card

ROTARY SHELF OVENS FOR LABORATORIES

Laboratory or production workers requiring extra precision control of

Dear Reader,

The largest operating display of metalworking tools and equipment ever to be exhibited in this country is scheduled for the International Amphitheatre in Chicago, September 6th through 16th, only a few short months away. This Exposition in which more than 130 U. S. machine tool companies will display more than 1,000 of the very latest models of American-built machine tools will be sponsored by The National Machine Tool Builders' Association. It is not too early to start thinking and planning for a visit to this Exposition. Remember, it's The Machine Tool Exposition — 1960.

Yours very truly,

Fred W. Vogel, Editor
MODERN MACHINE SHOP

STANDARD

circular form tools make MORE PROFIT

Now you can save time and money on a wide variety of form tool operations by replacing costly madeto-order or hand ground tools with Somma Standard Circular Form Tools.

In addition you are assured of uniform accurate dimensions every time, easier set-ups, and a better finish on the parts.



And Somma Standard Tools are available through the Somma representative in your area. Write for new catalog and price list of standard tools and blanks.

SOMMA TOOL CO., INC. 120 SCOTT ROAD, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal. For more data circle 597 on Postpaid Card



FLEXIBLE SHAFT MACHINES . . .



- Grinding
- Rotary Filing
- · Wire Brushing
- Buffing
- Polishing
- Power Drives
- Remote Controls

The complete flexible shaft machine line with horsepowers from ½ to 3, with wide range of speeds, shaft sizes; tripod floor mountings, bench or vertical models available for every operation.

Send for literature!

N. A. STRAND FLEXIBLE SHAFT, INC.

603 So. Washtenaw Ave. Chicago 12, Illinois

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new equipment . . .

heat uniformity will be interested in a new rotary shelf laboratory oven, available from Despatch Oven Co., 619 Eighth St., Southeast, Minneapolis 14, Minn. The rotary shelves, either manually or mechanically operated, are spaced on 12 inch vertical centers. Despatch recommends manual operation for temperatures below 300 degrees F. For higher temperatures to maximum of 850 degrees F., there is a motor and reduction gear provided to maintain constant shelf rotation.

The rotary shelf oven comes in all sizes of Despatch "V" oven series. This series can be supplied for gas, electric or steam heat. It utilizes forced convection with horizontal air flow. Even without the rotary shelf, this model maintains heat uniformity within plus or minus 1 degree C. throughout the work chamber. The addition of the rotary shelf is said to give identical heat to every product placed on the shelves.

Other features include hinged, plugtype doors located within one main door on same level as rotary shelf for easy removal of product.

For more data circle 171 on Postpaid Card



Despatch Laboratory Oven has rotary shelf

SPRAY GUN FOR APPLYING PROTECTIVE CERAMIC COATINGS

A high pressure, high velocity spray gun, for applying ceramic coatings to metal and other non-porous surfaces, is announced by Metallizing Co. of America, Inc., 3520 West Carroll Ave., Chicago 24, Ill. The ceramic spray gun applies an even, fine mist of protective coating that can be built up to exacting, specified thicknesses. Benefits of

the ceramic coatings are varied, including thermal, friction and corrosion protection. Spray coatings help solve problems involving electrical insulation, wear resistance and extremes in temperature.

Coatings are applied to metal and other non-porous surfaces easily, quickly and inexpensively by the automatic heating of the tip of a solid ceramic rod in the spray gun. Molten ceramic particles are then sprayed at high speed to objects or parts to be

when millionths count... hold them with

The state of the s

Exclusive Features - Unbeatable Price!

• Cartridge type nitralloy wheel spindle—rapidly interchangeable.

 Long tapered, phosphor bronze, pre-loaded twin angular contact precision bearings with forced lubrication.

 Wheel feed with hardened threadground feedscrew.

- Fine infeed to dead stop, sensitive to and graduated in 25 millionths.
- D.C. live and dead workhead speed selection (75 to 780 rpm)
- Internal Grinding Attachment (17,500 and 22,000 rpm).
- Full range of accessories including Collet Att. Swivelling Workhead, Angular and Radius Dressers, etc.

Engineered to grind:

Round to00002" Parallel to00001"

Finish to ... 3 microinches

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For more data circle 599 on Postpaid Card

\$2650



Metallizing Ceramic Coating Spray Gun

coated. Three types of rods—aluminum oxide, zirconium oxide and zirconium silicate—each offer chemical inertness, dimensional stability and other specific characteristics best suited to individual applications.

The technique has been used suc-

cessfully in coating combustion chambers and exhaust nozzles of rockets, in order to withstand the intense heat of explosion and exhaust gases. It has also proven ideal for carbon mating, efficient electrical insulation, chemical barriers and, in general, ceramic coating retards wear on moving parts to extend the life of shafts, bearings and equipment.

Most important is the fact that ceramic coating equipment produces a protective surface that is relatively invulnerable, when exposed to even the most intense heat or severe cold.

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FLEXIBLE SHAFT HANDPIECE SOLVES DIFFICULT FINISHING PROBLEMS

Foredom Electric Co., Inc., Bethel, Conn., announces the No. 55 angle type handpiece. Small, and lightweight (6½ by 5% inches and only 4 ounces),



MONEY-BACK TRIAL OFFER Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

up to 1500°F. Brush on, heat, brush off. All metals.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time ... P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic water-soluble paste. Inorganic. Thin before applying and start welding at once. \$3.40 per gallon, f.o.b. Dayton.

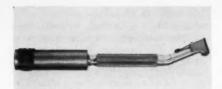
P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.45 per gallon, f.o.b. Dayton.

PROTECT-O-METAL

G. W. SMITH & SONS, INC.

1702 SPAULDING RD., DAYTON 3, OHIO

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Foredom No. 55 Flexible Shaft Handpiece

the handpiece resembles a dentist's drill and, like a dentist's tool, is ideal for reaching difficult and other-

wise inaccessible spots. It is sturdily built, however, for industrial work and meets the exacting needs of the electronic and instrument industries, as well as metalworking, especially in tool, die and mold work.

The No. 55 handpiece has a latch type toolholder, hardened steel gears and chromium finish. and is easily attached to any Foredom Flexible Shaft Machine. Equipped with two mandrels, it can be used with standard unmounted accessories and very small dental type burs, drills, abrasive points and so on. Can be used without modification for deburring, grinding, polishing and similar jobs.

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HEAVY DUTY ENGINE LATHE

Advance design and specification details for another heavy duty engine lathe in its new line have been announced by Sidney Machine Tool Co., Sidney, Ohio. This lathe, the Sidney 3220, is offered in three models, with swings over the bed of 32½, 35½ and 38¾ inches. Swings over the compound range from 20½ to 28½ inches. Features include anti-friction bearings



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throughout, automatic lubrication to all parts, a 60 h.p. drive with no speedup gearing and all gears hardened and ground or shaved.

Metal removal rate of the 3220 is said to be up to 145 c.i.p.m. The head-stock has 36 spindle speeds in true geometric progression, cutting speeds automatically calculated through a single dial control, an overall speed ratio of 160:1 and full 60 h.p. delivered in all speed ranges.

A dual cam tumbler lock is one of the distinctions of the new gearbox design. Others are anti-friction lead screw thrust bearings, 60 threads and feeds and a direct reading feed and thread plate.

The apron includes combination feed and traverse and independent cross and longitudinal controls. Bottom

Master Tool Planning, Procedure Writing, Cost Estimating, Cost Reduction Review, Product Improvement Review, Quality Control, White Room Consulting and Design, Grey Room Consulting and Design, Report Writing and Typing, General Typing and Retyping.

MANUFACTURERS CONSULTING SERVICE

643 South Mitchell Avenue Lansdale, Penna.

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slide travel is 16 inches and top slide travel adds $6\frac{1}{2}$ inches. In-built four way rapid traverse movement is provided in the carriage and compound. For more data circle 174 on Postpaid Card

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BAND SAW GRINDERS

The Series "A" Band Saw Grinding Machines, recently announced by Hanchett Mfg. Co., Big Rapids, Mich., are available with attachments for full universal saw sharpening applications. The new attachments consist of a continuously variable lift adjusting mechanism and a continuously variable feed adjusting mechanism. These continuously variable adjustments are controlled by handwheels and the adjustments may be made with the machines in operation. With these attachments, the Series "A" Machines will sharpen any depth or any spacing of regular band saw teeth without changing cams. These attachments are



No. A-220 Automatic Band Saw Sharpener

valuable for use whenever the machines are installed in saw service shops, saw manufacturing plants or in plants where a wide variety of saw teeth must be sharpened. These variable attachments can be furnished with the A-220 (12 inch capacity) machine. A-230 (14 inch capacity) machine and A-240 (16 inch capacity) machine.

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SERIES OF 22 AIR POWERED VERTICAL SANDERS

High torque and lightweight construction have been combined in a medium duty series of air powered vertical sanders, announced by Buckeye Tools Corp., 5013 Springboro Pike, Dayton, Ohio, Known as the 58S Series, the family contains 22 geared models.

Twelve are equipped with governors. Six basic models in this classification range from 1.850 to 8.500 r.p.m. and expand to 12 with a choice of thumb flip or safety throttle.

The ten non-governed models (one of which is shown) are similarly divided into two five-member groups by the throttle choice, and their speeds range from 1,500 to 7,200 r.p.m.

None of the models weighs more than 6 pounds. All bear a spindle thread of 5% inch-11 and have a fully adjustable dead handle. Six models, intended for operation at 7,200 r.p.m.



Buckeye Air Powered Vertical Sander

or more, use 5 inch pads; all others are 7 inch.

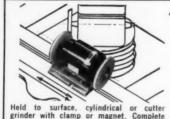
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AIR AND HYDRAULIC CYLINDERS

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill., has announced its Powrmation Series low pressure air and hydraulic cylinder line. These cylinders are offered in 11/2 through 8 inch bores: capacities are 250 p.s.i. air and 400 to 1,000 p.s.i. hydraulic, depending upon bore size. The Powrmation Cylinder has a generous factor of safety.

A wide variety of mountings, rod diameters and rod ends make the Powrmation Cylinder adaptable to practically any installation. Mountings include side lug, center lug, basic, tie



data in Spec, Sheet DW-160.

Announcing NIAGARA CUTTER Motorized DRESSER

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NIAGARA

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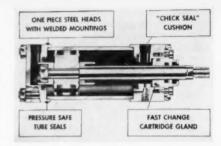
Low price, order yours now. Only \$39.50 For more data circle 603 on Postpaid Card

rod, flush side, front flange, rear flange, trunnion, clevis and double rod styles. Strokes can be made to any practical length. An extra long bearing, available with an optional gland, makes internal spacers unnecessary in many long stroke cylinders.

Three important design features make the cylinder stronger, more leak-free and of greater service in high speed applications.

For added strength, mountings are welded to the one piece steel heads. All mountings will carry maximum cylinder loads with a generous safety margin. The welded construction assures squareness of mountings and there is no danger of mountings loosening, due to vibration.

To guard against leakage, cylinders have a pressure safe tube seal. This seal, located on the o.d, of the tube,



Hanna Powrmation Low Pressure Cylinder

forms a positive seal at all pressures from zero to maximum. The head and tube confine the "O" ring, so it will not extrude at high pressures.

A check seal cushion in the cylinders minimizes destructive effects of heavy or high speed loads. This cushion is said to be a major improvement in air and hydraulic cylinder design. Among the advantages claimed by the manufacturer for this cushion are: faster

FAST, CLEAN, ECONOMICAL HEAT

Provides high, fast heat for metal bending, metal forging, occasional heat treating, metal forming and preheating. Clean, efficient, equipped with four burners. Two end burners have separate shutoff valves, may be turned off for smaller jobs. Operates economically on any type of gas. Convenient gas-air adjustment panel. Adjustable swinging refractory lid. Adjustable front rack to support long pieces and hold tools. Solenoid safety valve turns gas off automatically when blowers are turned off. High temperature.

insulated firebox, 5½" by 7½" by 27". Maximum 425,000 BTU input. F.O.B. Factory \$246.00.

If it burns gas () look to Johnson



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operation of cylinders, better control, longer life with greater uniformity of action, easier maintenance and increased cushion length.

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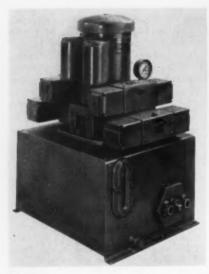
HYDRAULIC POWER UNIT PACKAGE INCLUDES VALVES

A larger capacity model in the CircuitPak line of pre-engineered and

packaged hydraulic power units is announced by Double A Products Co., Manchester, Mich. Mounted on the 10 gallon reservoir are the electric motor (1, 1½ or 2 h.p.) and from one to four solenoid controlled, four way directional control valves, with no external piping whatsoever. The Gerotor pump within the reservoir is available in 1, 1½ and 3 g.p.m. capacities.

The Double A Valves (with tandem center spools) are mounted in series





Hydraulic Power Unit includes valves

to provide automatic unloading. A built-in relief valve protects the system. For more data circle 178 on Postpaid Card

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NUMERICAL CONTROL FOR LATHES

The application of positioning controls for turning, facing and boring has



Numerical control applied to Monarch Lathe

been made by Monarch Machine Tool Co., Sidney, Ohio, to its versatile Series EE, Model 1000 Lathe. A console, located convenient to the operator, provides numerical control through a modified General Electric Mark II Unit. All of the regular control features have been retained. making the machine adaptable to conventional manual operations in a few seconds' time.

Data input is from standard eight channel, 1 inch wide punched paper tape, prepared on a Flexowriter. A programmer sets up information. which is punched on the tape in block form. Each block directs the dimension the carriage must move from the zero point, as well as the diameter information for movement of the cross slide. Feed rates are set up, as well as spindle speeds and other auxiliary



Dugas "AIR FLASH" SPACER

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functions. When the tape is read on the tape reader in the control console. the information is interpreted in the director cabinet and remains in memory until the proper carriage and cross slide positions are obtained. Feed-back units on the carriage and cross slide signal the director when the commanded position has been reached.

The versatility of the Series EE, Model 1000 is particularly adapted for numerical control, as this lathe has four infinitely variable speed ranges which are power selected. Tape commands can select any of these ranges and, through five manually set potentiometers controlling the drive motor speed, can select any one of five speeds for a given cycle. The infinitely variable 15 h.p., d.c. main drive motor gives speeds from 20 to 2,000 revolutions per

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machine

Featuring a compact 11/8 inch bore size in its range of 12 bore sizes through 12 inches, these hydraulic cylinders are available in 23 different mounting styles and four different rod ends for maximum flexibility of installation. A design feature is that the cushion adjustment and check both fit flush into the cylinder end plates, saving space and eliminating clearance problems, and both are interchangeable, resulting in greater convenience for adjustment and greater flexibility in installation.

Smoother action results from the one piece piston, having a solid head which eliminates air pockets and allows for quick bleeding. Full area ports on this high pressure hydraulic cylinder also aid in greater speed and power.

In addition to its more efficient power and ease of installation, the high pressure hydraulic cylinders are ruggedly built for minimum mainte-

HYDRAULIC CYLINDERS

Maximum flexibility of installation and smoother, more precise power highlight the complete new line of interchangeable, heavy duty, high pressure hydraulic cylinders for 2,000 p.s.i. (3,000 p.s.i. non-shock) operation. recently introduced by S-P Mfg. Corp., 30201 Aurora Rd., Solon, Ohio.



S-P High Pressure Hydraulic Cylinder



Available through wholesalers everywhere.

FOSTORIA CORPORATION FOSTORIA, OHIO For more data circle 607 on Postpaid Card

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MODERN MACHINE SHOP

305

March, 1960

nance. The "Clinch-Tite" end seal is said to maintain a leakproof seal at all pressures, since any increase in internal pressure automatically reduces the radial clearance at the pilot fit, thus eliminating any O-ring extrusion.

To help make servicing easier and faster, this line features a quick change, self-contained cartridge unit which is externally removable without loosening any tie rods, removing the retainer plate or dismantling the cylinder. This single unit combines an extra long bronze bearing for maximum side support when the piston rod is extended, a wear-compensating lip-type wiper seal that seals out the dirt and a flexible self-adjusting rod seal.

Another design development is the use of Heli-Coil inserts as the piston lock, eliminating the use of nuts, half-and-half set screws, lock pins and other less desirable means of locking the piston on the rod. The solid surface of the piston head eliminates air pockets, resulting in the smooth powerful stroke of this cylinder without any loss of power or interruption. This Heli-Coil insert piston lock also permits quick and easy replacement of the piston or the rod without any loss of thread strength. Made of high tensile, stainless steel alloy, this piston lock

will resist corrosion and give long trouble-free service.

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CONTINUOUS, HORIZONTAL BROACHING MACHINE FOR CONNECTING RODS

Foote-Burt Co., Cleveland 8, Ohio, announces its Model 15L Broaching Machine, which employs a vee belt drive, permitting speed changes, if desirable. Earlier machines employed direct drive. The belts drive a worm shaft, power being transmitted through this worm and a worm gear, then through a new herringbone-tooth pinion and gear to the driving sprocket. The herringbone gear, a replacement for earlier helical gears, is utilized to provide smoother transmission of power and because it results in a stronger gear tooth. In addition, the new gear is roll forged and heat treated, producing a bull gear of unusual strength with the stamina required for heavy, continuous broaching in high production applications.

The fixture-chain driving sprocket has also been redesigned, from a sprocket spool keyed to its drive shaft to a one piece unit, in which spool and shaft are one. By making the sprocket spool, hub and shaft in one piece, a considerably stronger unit is provided. The objective was to completely redesign the power tranmission system

BOSTON UNIVERSAL ANGLE PLATE Puts Speed and Profit into Angular Precision Tool that Holds Work Drilling, Milling, Planing, Shaping, Grinding of Any Desired Angle. With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures. Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with Made in several stock sizes. Write today for full information. vernier scale reading to 5 minutes 10 ARBORETUM RD. inc. BOSTON 31, MASS.

to provide the reliability for handling heavy cuts under continuous operation without any downtime for machine maintenance. Shear pins are provided in the drive system in order to protect both the machine and broach from breakage.

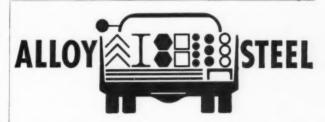
In line with the greater strength engineered into the 15L, the main bed casting and the fixture tunnel, which supports the broach holder, are one

piece. In earlier models and in the lighter machines. the fixture tunnel sides are separate units, mounted on the bed. While this separate construction has provided a strong. reliable machine for many years, the new 15L employs the considerably strong one piece construction.

The drive chain has been redesigned. The new chain is a unique development, specifically for broaching machine applications. The chain is employed to carry the fixtures for the operation shown, in which 3/16 inch of material is removed from three surfaces of a forged automotive connecting rod.

The coolant system can be either integral or omitted, where a central system is employed. Electrical equipment consists of a pushbutton station for machine control, with a special plugging switch for immediate stopping. An automatic plugging switch senses an improperly loaded part and plugs the motor for an instantaneous stop before damage can be done to the machine or the broach.

Maximum metal removal capacity in mild steel is 20 c.i.p.m., in cast iron,



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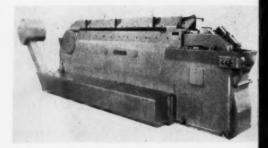
DON'T MISS

the April issue of

MODERN MACHINE SHOP

which will feature the various products that will be on display at the A.S.T.M.E. Tool Show in Detroit—April 21-28.

new equipmen? . . .



Model 15L Horizontal Broaching Machine

30 c.i.p.m. Drive motor is 30 h.p. Maximum broach length is 110 inches. Floor space, without chip removal conveyor, is 88 by 198.

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METAL CORROSION PREVENTATIVE

Corrosion Reaction Consultants, Inc., 116 Chestnut St., Philadelphia 6, Pa., recently announced the introduction of a new liquid formula which is useful in both metal manufacturing and metal maintenance.

Called CRC 3-36, it is a simple, effective, low cost anti-corrosion treatment for bare metal, plated and painted surfaces. It is said to successfully prevent corrosion of iron, steel, aluminum, copper, brass, magnesium and other commonly used metals.

CRC 3-36 has been designed to check corrosive deterioration of bare, plated or painted metal surfaces; maintain tools, instruments, dies, fixtures, jigs and precision machined surfaces.

CRC 3-36 has unusual penetrating power and is particularly effective in loosening, turning or sliding parts "frozen" by corrosion.

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 Hydraulic feeds and infinitely variable spindle speeds
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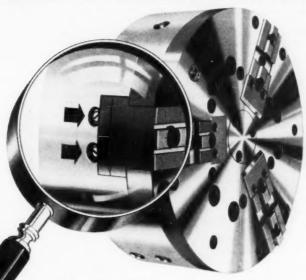
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This Buck feature TRIPLES chuck life-Keyway gibs take up wear

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.001" precision is guaranteed by the famous Buck Ajust-Tru principle that permits machining jaws in the tool room and final precision adjustment under full gripping pressure.

Front plate, ways, master jaws, gibs are all hardened and ground and thoroughly lubricated.

These unique new power chucks are another reason why—"You make money every time you chuck with Buck." Send for a catalog—see for yourself.

Aluminum Body power chucks are available in diameters up to 18". Also see the Scroll, Independent, Dust-Proof, and Gear chucks. **BUCK TOOL COMPANY**

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Windings and air gap completely protected from dust, dirt, chips.

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Inserted steel rack prevents radial motion which can cause uneven tooth loads on feed pinion. Also insures accurate alignment when multiple heads are used.

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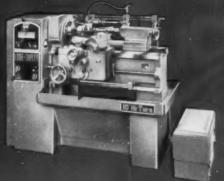
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Hi-Turn



BIG LATHE FEATURES, PERFORMANCE, ACCURACY - AT LOW COST

The 10" HI-TURN 45° COPYMATIC is extremely rugged, built to do production jobs at time and money-saving rates. With all the features noted, plus traditionally high Lodge & Shipley standards of quality . . . the price is still substantially below many lathes having fewer features, less horsepower and light construction. If you perform manufacturing or tracer lathe operations, you probably have comparatively small jobs running on big, costly lathes. A HI-TURN does both types of operations . . . gives you productive capacity matched to the job for low costs. For complete details, request Bulletin HL-105.

THE LODGE & SHIPLEY CO., 3058 COLERAIN AVE., CINCINNATI 25, OHIO

BIG LATHE FEATURES AT LOW COST

- · All-hydraulic 45° tracer control
- Template-type multiple length stops
- 9 forward and reverse speeds, up to 3000 rpm
- · All-spur gear, anti-friction bearing headstock
- · Full 5 hp Dinabrake motor, leg-mounted and wired
- . Totally-enclosed, 9-feed quick change gear box
- · Reversing drive for cross-center facing
- · Automatic lubrication throughout
- · Uses round or flat templates
- Direct-reading diameter and length dials
- · Rapid traverse "in" and "out"
- · Reservoir pan, coolant pump and piping
- · Oil-tight "start, stop, reverse" buttons
- · Built-in horsepower ammeter
- · Hardened, ground tailstock spindle with tang driver
- Hardened and ground bedways and crossways



odge & Shipley

... your Lodge ical choice



